

**Docket No. SA-537**

**Exhibit No. 2-B**

**NATIONAL TRANSPORTATION SAFETY BOARD**

**Washington, D.C.**

Operations Group Chairman Factual Report

Interview Summaries

(139 Pages)

# Attachment 1

To Operations Group Factual Report

DCA13MA120

Interview Summaries

## **Interview Schedule**

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**Interview:** Bong Dong Won, First Officer, Asiana Airlines  
**Represented by:** John Dean, ALPA  
**Date/Time:** July 8, 2013, 0823 PDT  
**Location:** San Francisco, California  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Mike Coker-Boeing; In Sun Suk -Korea ARAIB; Cho Yong Sun- Asiana Airlines; Shin Donghoon (interpreter)

During the interview, First Officer Bong stated the following:

He was a B777 First officer (FO) for Asiana Airlines and was 40 years of age. His date of birth was [REDACTED]. He had been assigned to the B777 for one year two months. He flew the A320 for 3 years 6 months before that, and he was hired at Asiana in December, 2007. At the time he was hired he had 1,500 hours. His total flight time was 4,600 hours, his B777 time was 1,000 hours and he had no PIC time in transport aircraft. He flew the F5 and F16 in the Korean Air Force. He had previously flown to SFO 5 or 6 times. He had flown with Captain Lee Kang Kuk before in the A320, but it was his first flight with Captains Lee Jung Min and Lee Jong Joo. The accident flight was the first flight of the current trip and his home base was Incheon airport. The crew was scheduled to return to Incheon.

The accident flight was a training flight, so the instructor and training captain flew and there was no FO. The captain assisted during landing and he had special duty as FO to monitor the flight and respond to ATC. He occupied the right pilot seat during cruise after takeoff. He was not in the seat for takeoff. The flight departed Incheon at 1653 local time and he occupied the right seat starting 4 hours and 15 minutes after takeoff and remained there for 5 hours and 15 minutes. When not in the right seat he was seated in seat 1F in the cabin.

He returned to the cockpit when the airplane was at 11,000 feet. He was in a middle seat and knew to return because he monitored the chime sound and watched the altitude on the cabin entertainment system. Captain Lee Jong Joo remained in the cabin in seat 1E since they needed only one FO to support and monitor. He realized the flight was near SFO and was planning an approach to runway 28L when he entered the cockpit. The flight received radar vectors and was cleared for a visual approach after calling the runway in sight. The crew set the localizer frequency, then armed and captured the localizer. They were cleared to descend to 4000 feet. He thought they were a little higher than the normal profile. They set the flaps to 5 and ATC asked them to maintain 180 kts until 5 miles from the airport.

The instructor pilot was the pilot monitoring (PM). The speed was high, so even though the ATC clearance was maintain 180 knots, they set speed to 172 knots. He wanted to make sure the PF and PM recognized the instruction, so he asked them about the speed and they said "yes we know." They changed to flaps 20 speed and set the approach speed in the mode control panel (MCP). The aircraft was about 300 or 400 feet above a standard 3 degree approach angle profile. Using distance to estimate height, and 7 to 8 miles out, he multiplied 3 times 8 and he thought

they should be at about 2,400 feet and they were 2,700 to 2,800 feet. Even though they set the approach speed, speed was still high, so they changed to vertical speed mode. Before that they were in flight level change mode. The PF (in the left seat) set VS to 1,000 fpm, but the right seat IP told PIC, "Why don't you set it to 1,500 fpm?" He did not recall how far out that happened. After the PF changed the vertical speed command to 1,500 fpm, some time passed, and then he disconnected the autopilot (AP). He observed that the descent rate was "a little more than 1,500, it was like 1,700 or something like that." At the time, the aircraft was approaching 1,000 feet, so he "prepared in his mind to recommend something, to advise them, but he did not."

The PF ordered flaps 30, but the speed was so high that the PM did not follow his order, just hesitated, and said "hold it." After the aircraft slowed below the maximum flap speed, the PM selected flaps 30. When they passed below 1,000 feet, he continued to observe a descent rate of more than 1,000 fpm, so he advised them of the sink rate more than 4 times. The PM selected flaps 30 at about 160 kts, but the FO could not remember how high they were when the PM did that.

He was sure the autothrottle (AT) was on but when asked what was the position of the AT arm switch and the status of the AT, he could not recall and he was not sure what status was indicated on the PFD. When the pilots decided to set vertical speed, the altitude set on the MCP was 1,800 feet, and this was done after they received approach clearance. They then changed from flight level change to V/S mode, and the altitude in the MCP stayed at 1,800 feet. After flaps 30 were set, the PM opened the landing checklist page, and asked Bong "are we cleared to land" and Bong answered "yes." Since Bong advised of high sink rate several times, he was monitoring sink rate and saw that it was decreasing, "1,500, 1,400, going up." When he recognized this correction was going on, and after passing 500 feet, seeing the vertical speed was less than 1,000 fpm, he decided not to advise anything. Pitch increased so he could not see the runway through the windscreen. He thought that the approach was coming up to the normal position, because the small dot in the middle of the airplane symbol was coming up in the display.

When he saw the airspeed on the right PFD, it indicated the speed was below the minimum and the hatch marks were coming up. The PF was flying and he put his hand on the throttle. The PM added some power using his left hand and the aircraft nose started coming up. He did not hear a stall warning. He then saw the PF with his right hand on throttle.

Asked what he saw as the airplane touched down, he said he heard the radio altimeter calling off "50, 40", he saw the power being added, and then as he thought they were going around they had a hard landing. He could not tell where the aircraft was when it touched down. After the first touchdown, there was a second touchdown and his body hit the left armrest. He could not recall exactly what happened because it was dusty and the aircraft was spinning. He did not know exactly when the aircraft came to a stop. He found it hard to breathe because he hit his stomach and he was trying to calm down. A cabin crewmember he didn't know opened the cockpit door and asked if they were okay. He answered "yes."

He saw that the captain was preparing to communicate with the tower. Bong was already pulling out his hand microphone to communicate with the tower, but he saw that the PM Captain (right seat) was talking to ATC. The purser came to the cockpit and asked if they should initiate the evacuation and he said "yes." Then he heard the cabin crew shouting evacuation instructions. The PM (right seat) captain turned around and asked Bong to get the evacuation checklist. Bong gave it to him with it opened to the back side where the evacuation procedure is located and he read the checklist right away. He did not think there was an evacuation signal switch on the overhead panel and he did not hear any evacuation horn or alarm. He took the checklist back and the relief captain came in the cockpit and said "let's get out." He followed the relief captain. He couldn't see anything because of the smoke, and he exited the aircraft on the 1L slide. The slide was at a shallow angle, so he slid on his behind.

After he was on the ground he looked at the aircraft and heard someone say the 2R exit slide had deployed inside the airplane and someone was stuck in the slide. He climbed back into the aircraft through 2L and saw one cabin crewmember was stuck in between the slide and the lavatory. He pushed the slide but it would not move. He tried to puncture the slide with a pencil, but it broke. He went back to the 2L door and shouted "we need a knife." Smoke was coming from behind the slide area and aft of the galley, fire was beginning to come into the aircraft. He asked the cabin manager to bring him a fire extinguisher, and he used it in the area of the slide. It decreased the fire but did not completely extinguish it. He used all of the contents of the extinguisher.

The cabin manager obtained a knife from the galley and he used it to poke the slide, which "popped." He pulled the trapped female flight attendant out and helped her exit on the L2 slide. He also exited and stood on the tarmac. He was not certain of the distance he went from the aircraft, but everyone was on a paved road to the left side of the aircraft.

He confirmed that Captain Lee Kang Kuk was in the left seat and Captain Lee Jung Min was in the right seat during the accident, and the same was true for the original takeoff. During the time FO Bong was in the right seat during the flight Captain Lee Jong Joo was in the left seat. He confirmed that Captain Lee Kang Kuk set and changed altitude and vertical speed on panel. He set 1000 fpm but Captain Lee Jung Min advised him 1,500 fpm.

He called "sink rate" 4 times. He felt the descent rate began to decrease to 700 to 800 fpm and was moving toward the normal position they should be in. When he saw the IP push the throttle up, he heard the radio altitude aural automatic callout "50-40-30." He did not recall hearing any conversation between the pilots during the last 500 feet of the descent. He did recall the right seat captain performing and calling out the landing checklist. All three pilots were wearing headsets. He did not recall what happened to vertical speed or autothrottles below 500 feet and he did not recall the vertical path or autothrottle modes or management below 1,500 feet.

He described the baggage in the cockpit. On left side of cockpit there was a luggage bin, but he didn't know what was there. On the left side of the cockpit was a flight bag and on the right side

another flight bag. Placed to the right of his seat was his flight bag, Lee Jung Min's layover bag and another small bag of Bong's.

The flight originated at Incheon and was the first of the trip. He was off duty on July 1<sup>st</sup> and 2<sup>nd</sup>. He reported for duty on July 3<sup>rd</sup> but the flight was cancelled so he returned home. He stayed home July 4<sup>th</sup>. The accident flight departed on July 6 at 4:30 PM.

He had a normal sleep schedule on the nights of July 3<sup>rd</sup> and July 4<sup>th</sup>, going to sleep between 0200 and 0300 and arising between 9:30 and 10 AM. Thursday July 4<sup>th</sup> he stayed home and read books. On Friday, July 5, he had to stay at home until 4 PM, then he picked his daughter up at school and they had dinner together "outside." They came home at 8 PM. On July 6 he didn't do anything special, went to bed at 2 AM after reading books, and woke at 11:30 AM on July 6. The quality of his sleep was good.

After waking at 11:30 on the 6<sup>th</sup> he took a shower, had lunch, and left home around 12:50 PM to catch a bus to the airport which left at 1:10 PM. He arrived at the airport at 2:20 PM. The official show time was 3:10 PM. During the flight he took a two hour nap. He had dinner about two hours after takeoff and then slept about two hours. He was in a business class seat which reclined flat. His sleep quality was good.

He normally goes to bed between 2 and 3 AM and gets up between 9:30 and 10AM, and normally the quality of his sleep was pretty good. Regarding how rested he felt before the accident flight, he felt okay and had no complaints. The accident took place at 11:30 AM, which was 3:30 AM Seoul time. Late in the flight, he was tired, so he read a book for ten minutes and then slept. He flew for 5 hours and 15 minutes and near the end of his duty he felt a little bit of tiredness. That was at about 9:30 after takeoff.

They changed crews a little bit earlier than scheduled, about 15 minutes earlier than scheduled. After crews changed, he took a 20-30 minute nap at 9:30-9:50 after takeoff. The flight was 10:30 long. After the nap and before going to the cockpit he was kind of tired, but was trying to wake himself up. He went to the bathroom and did some stretches. After the second nap and before entry into the cockpit, he had no caffeine drinks. During his duty time in the cockpit, he had two or three cups of black coffee. During the flight he had a beef steak with coffee in the first two hours, and two hours before landing he had two croissants and one cup of coffee. His overall coffee consumption was one cup in the first two hours, two cups after 4:30 into the flight, one more cup between 4:30 and 8:30 into the flight and one more cup two hours before landing.

He had previously flown with Lee Kang Kuk one or two times a few years previously. The flights were very normal flights and he had no special impressions of the captain's proficiency at that time.

He flew in the back seat monitoring for Lee Kang Kuk during his B777 training flight to London in the last week of June. The flight was not memorable and he had no special impression of it. It was a normal OE flight with the IP pointing out things. He recalled a conversation the captains had about rejected takeoff (RTO) procedures. During the London flight he only observed his performance during landing.

During the accident flight the two captains seemed to get along and had no conflicts, just normal crew interaction. Bong had received a cockpit resource management (CRM) course. The cockpit mood was quiet with normal callouts, responses and actions. Both captains seemed to have normal health and had no symptoms of illness. Regarding their alertness, he noticed “a little late response” to his sink rate callout, but they did respond. He did not recall which pilot responded to the sink rate callout. He was monitoring the sink rate indication and he did not hear a voice response. He was only concerned about the sink rate number and did not recognize what the pilot did to reduce the sink rate. He did not see the IP provide much coaching to the PF and he did not recall if either pilot spoke when the PM added thrust. He could not recall the AT being disconnected or if the vertical mode was taken out of VS mode.

All crew flight bags were in cockpit. His layover bag and that of Lee Jong Joo were in the overhead bin in the cabin area. They were directly above their seat, 1E and 1F.

When asked if he had experienced any significant recent events involving his health, finances or personal life in the year before the accident that could have caused stress for him, he said no.

The only medications he was taking were a health supplement for eyes and vitamins. The name of the health supplement was Bilberry but he did not remember the brand. It may have been a blueberry extract. His health was good and there were no restrictions on his medical certificate. He had no chronic medical conditions and took no medication in the week before the accident. His last use of alcohol was a glass of wine the evening of July 4<sup>th</sup>. He was not asked to undergo a urine or blood test after the accident. He went to Peninsula Hospital after the accident, where he was admitted and received a wristband. The hospital took blood and urine samples. He was in the hospital about three hours. He had a possible fractured 10<sup>th</sup> rib. No other flight crew members were at that hospital, and he did not know if any of the other flight crew went to a hospital. He had no illnesses during the flight.

Regarding his work schedule, his schedule was released monthly. He could not recall the topics discussed during CRM training. He had CRM training with cabin crew in February, 2013. He had not received fatigue management training. His last simulator training was in March, 2013. His annual check ride was in May, 2013.

He thought the approach to SFO was more difficult than approaches to other airports because ATC gave pilots late descent instructions and gave speed restrictions. The speed limitation is similar to other airports, but “they normally get a short pattern with high altitude and high speed, so that’s why it’s difficult.” Asiana pilots knew about this. To account for the possibility of a late descent clearance and speed restrictions, Bong and Lee Jong Joo gave Lee Kang Kuk some tips during the last crew change. They said to expect “shortcut” vectoring and to have to deal with being held at high altitude for longer than normal. He was not present when the approach briefing was accomplished. They had seen the NOTAMS and knew the glide slope for runway 28L was out of service. He thought the pilots had a normal conversation and briefed this.

It was his opinion that the late descent clearance might have increased crew workload. The lack of an ILS glide slope meant that only the precision approach path indicator (PAPI) would be available for the profile. He did see the PAPI and he thought at 500 feet it was two reds and two



whites but he was unable to see the PAPI thereafter. He thought the other two pilots were able to continue to see the PAPI.

He believed the company safety program was very good and interest of management for safety was high.

He was an FO and had received training for making takeoffs and landings. He was not sure if they ever made landings with flaps 25, but almost always they used flaps 30. He did not recall seeing the PF use the speedbrake for airspeed control. 1,500 fpm was the last VS commanded rate he observed before the AP was disconnected. The flight director on this airplane was of the crossbar type. Asked if he saw bars for the flight director (FD) or "land 2" or "land 3", he said both pilots FD's were turned off but then one, the right FD, was turned back on.

When the flight was cleared for the visual approach by ATC the airplane was on a turn to base and assigned a heading of 030°. He did not recall the flap setting at that time. He did not recall exactly when the landing gear was extended but it was earlier than normal because they needed to get down. The FD off then on action took place when the flight was on final approach. He did not recall the Vref speed; he only recalled they were assigned 210 kts during approach and then 180 kts until 5 DME. He was able to see PFD altitude and vertical speed on the left PFD and the airspeed tape on the right PFD from his position. He thought the AP was disconnected at around 1,500 feet. There was an approach chart available and the pilots had the charts out but they were cleared for and flew a visual approach. He did not recall which charts they had out.

He could not recall the exact position of the throttles at 500 feet but they were pretty far back. He did not recall if the AT was on or off. He did not recall the AT mode when the IP advanced thrust and did not know if takeoff go around (TOGA) mode was selected. He just saw the levers advanced. He did not know the pitch at 500 feet and did not recall how high they were when the FD's were recycled. The PF ordered FD's off and the PM's back on. This was the normal procedure for a visual approach.

It was his recollection that after the crash landing the cockpit door opened by itself. Fire began outside the aircraft and came inside, but he did not know exactly where it began. After 500 feet he could not see any visual reference outside the airplane and his only reference was inside, the left PFD.

He did not hear any aural low speed warning. He did not hear either pilot say "landing check complete." He recalled only that the PM opened the landing checklist page and asked if they were cleared, and he said "yes." Company procedure required a "landing checklist complete" callout. He did not wear eyeglasses. He did receive special training from the company on landing at SFO when he transitioned to the B777. He had flown charted visual approaches during his training and was aware of the San Mateo and the Bridge visual approaches but he did not know if Asiana required extra training different than that for other airports. He did not know of a special term for flying as an extra pilot, but it was only the second time he had flown only in cruise. Normally he would make takeoffs and landings but he did not in this case because it was captain's training. In the past he had flown into SFO as one of the front seat pilots but only as the PM. He had not heard the ATIS. The crew was flying the "golden gate" arrival. The localizer

was auto tuned and he and Captain Lee Jong Joo set up the FMC for the golden gate arrival and the localizer approach for runway 28L. He could tell the crew followed the localizer. The company had procedures for mandatory go around, but when asked what they were he could only say they would go around if they could not land safely or by ATC instruction. He said there were other conditions but he did not remember them. Asked if the company required a go around if the descent rate was more than 1,000 fpm, he said he could not remember. He did not know why the crew did not go around.

He did notice the speed dropping below Vref during the approach at around 200 feet. He did not know what the speed was but he saw hatched bars coming. This was 5 to 10 seconds before impact. Before that he did not notice anything wrong with the speed. He made no callouts when he noticed the low speed because the captain (pilot flying) was “grabbing and showing his reaction.” The pitch attitude did not seem normal. He thought the PF was compensating for the low altitude with a pitch up.

Asked at what point he noticed the airplane was lower than it should have been, he said he “just interpreted the increased pitch as a result of low altitude.”

He did not feel he had anything to add that might help understand the accident and did not know of anyone else we should interview.

The interview concluded at 1200 PDT.

**Interview:** Lee Jung Min, Captain, Asiana Airlines  
**Represented by:** John Dean, ALPA  
**Date/Time:** July 8, 2013, 1330 PDT  
**Location:** San Francisco, California  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Mike Coker-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun- Asiana Airlines; Shin Dong Hoon (interpreter)

During the interview, Captain Lee Jung Min stated the following:

He was a captain on the Boeing 777 and was 49 years of age. His date of birth was [REDACTED]. He began B777 training in 2007 and completed training in January, 2008. He became an instructor (IP) on the B777 on June 15, 2013. The accident flight was his first trip as instructor. His total flying time was 13,000 hours, his B777 flying time was around 3,000 hours, and his pilot in command (PIC) time was around 10,000 hours. His last aircraft flown was the B767. He served as First Officer (FO) on the B767 for 3 years and became captain on that aircraft in March, 2000. His date of hire at Asiana was February 1, 1996. Prior to that, he flew the RF4-C for the Korean Air Force for 10 years. His pilot certificate was Airline Transport Pilot (ATP) with type ratings for the B767 and B777.

In order to qualify as an instructor he needed to have 500 hours minimum on that aircraft and he fulfilled that. He finished five days ground school and 7 simulator rides during instructor training. He had one training flight in the right seat, and then received a check ride in the right seat. The training went well. One of his instructors was Captain Kang Seun Ku, and his check captain was Kim Jae Jung.

He was asked to describe the flight arrival in his own words. After Point Reyes, they crossed LOZIT intersection at 11,000 feet and 250 kts. Before passing the SFO VOR, ATC (air traffic control) cleared the flight to fly heading 140° and descend to 9,000 feet after passing SFO VOR. Their speed was 250 kts and ATC told them to slow to 210 kts. They were then cleared to fly heading 030° and descend to 6,000 feet. ATC asked them to report the runway in sight. The PF (training captain) told the IP (the pilot monitoring or PM) it was in sight and he told ATC it was in sight. ATC said turn left to 310° heading, descend to 4,000 feet and cleared for the visual approach to runway 28L. The PM was handling the radios. The training captain said “localizer arm” and the PM checked that it was armed. They rolled out and intercepted the localizer. After localizer capture, the training captain set 1,800 feet on the MCP (mode control panel) for DUYET intersection and called it and the PM checked it. Simultaneously, ATC said keep speed 180 kts until 5 miles from the airport.

Then the PF set VS mode and selected 1,500 foot per minute (FPM) descent rate and the PM checked it. The PM advised that the aircraft was slightly high. They saw the arc on the navigation display showed they would be high at DUYET. Other reference was basic distance and altitude. ATC switched them to tower frequency and he reported “Asiana 214 on final 28L.” Tower said “cleared to land on 28L.” Around 1,900 feet, the PF set missed approach altitude to 3,000 in the MCP. Around 1,500 feet, the PF said “manual flight,” and disconnected the

autopilot. He confirmed the disconnect on the FMA (flight mode annunciator) and called “FD (flight director) off.” The PM turned the left side off and the right side off then on. The PM initiated the landing checklist at 1,000 feet. When he opened the checklist page, the speedbrake armed was not completed so he armed it. The PM asked the FO (Bong) if they were cleared to land and he said yes, so the PM said “landing checklist complete, cleared to land,” He was not sure if he used a standard callout to indicate the checklist was complete.

Around 500 feet the airplane was slightly low, so the PM said to the PF “we are slightly low, use a little backpressure on the control.” The PM also applied very light pressure to the control wheel. Around 200 feet, he realized the speed was around 120 knots. He thought at the time maybe the AT (autothrottle) was not operating. He pushed the thrust levers up; the airplane was sinking. The PM declared “I have the controls, go around” and pushed the thrust levers forward and pitched up but the airplane was sinking. He experienced stick shaker, then impact. While executing the go-around he confirmed that pitch was more than 10 degrees, but speed was in the red bar. He was hoping the plane would create more lift, but it impacted the ground two or three seconds after beginning go around. When asked to clarify the sequence of events, he said he pushed TOGA and pushed the thrust levers up, pitched up to 10 degrees, he saw the speed decreasing, felt the stick shaker, and 2 or 3 seconds later he felt the aircraft hit the ground.

He realized that the aircraft was ballooning and it landed on the runway. Then it yawed to the left 360 degrees. Dust was flying up outside the cockpit and dust and things were flying around inside the cockpit. A cabin crew member came in the cockpit. She asked them “are you okay?” The PM was bending over the control wheel a little bit. The FO was grabbing his stomach, but he said he was okay. The cabin manager came to the cockpit and asked the captain “shall we initiate an evacuation?” He responded, “standby.” The PM said he could not recall exactly what he told ATC, but he intended to say first their call sign, and second to ask aircraft condition as seen by the tower. Tower said emergency vehicles were already coming. At that time he called for an evacuation and called for the evacuation checklist. He did not know who he talked to, just said “evacuation.” He tried to open his flight bag to get his QRH (quick reference handbook) but it would not open, so he asked the FO to give him his QRH, which he did. He did everything on the checklist. He asked the FO to retain the flight logbook but they couldn’t find it. They evacuated through the L1 door.

Captain Lee Jong Joo came into cockpit looking for the axe while the PM was doing the evacuation checklist. He thought there were some people still inside the aircraft, so he climbed up inside to see. The PM did not know exactly what the cabin person said but he walked back up to the L2 area to check on remaining passengers. He walked from L2 towards the rear of the airplane and found one elderly Chinese man sitting down in a middle seat. Then he found one more person in the cabin area. He told him to get out. The passenger was trying to get out through L3, but captain said go to L2. Three people, possibly young females, were sitting down on seats. The Chinese man was very large and he was unable to move him out of the chair. He exited the airplane and told a firefighter wearing a mask that there were still four people inside the aircraft. He tried to climb up the slide again and tell the firefighters, but they stopped him from climbing up again.

A male cabin crewmember climbed down from aircraft and the PM asked him “did you see the R2 emergency slide inflated inward?” Pressure of the slide was so strong the PM could not check to see if there was someone trapped. He was still worried about the Chinese man, but the paramedics carried him out and everybody was out. He walked to the taxiway where several passengers were sitting down on pavement. All four pilots and one male and one female cabin crewmember were together.

He got into a bus which was on the taxiway and rode to a building in an isolated area. Passengers were guided one way and the crewmembers were moved away. They were offered water and medical assistance. A police officer came to the PM and asked for basic information like his date of birth. FBI agents also questioned him. He was asked about the possibility of a bomb or terrorism and he said he did not think that was the case. The captain complained of neck and spine pain. Three or four paramedics tried to move him on a stretcher and provided neck protection but he said he did not want to go to the hospital. He removed the neck protection and remained where he was. The three captains (including him) and two cabin attendants were the last people remaining in the building. They were escorted by 7 or 8 police and took a normal crew bus to their hotel. They went to the civic center and the five of them arrived about 2300. He thought other crew members were hospitalized but did not know. The FO, who had been discharged from a hospital, was already at their hotel when they arrived. No one from Asiana went with them. His only injuries were muscle pain in his back and bruising and light scraping on his shoulders from his shoulder harness. No drug testing was done and no blood or urine samples were taken. Several Asiana staff helped them at the airport but he did not know them.

He had never flown with Lee Kang Kuk and he did not recall if he had flown with Lee Jong Joo, who was similar in seniority to him. He had not flown with FO Bong before.

The PF, Lee Kang Kuk, was the one who disconnected the autopilot. The PM recalled feeling two impacts and he initiated a go around before the first impact. He attempted to help the Chinese passenger first and told paramedics about the remaining passengers. He went back to the airplane one time. The PM was considered to be the PIC. He did not see a doctor and only saw paramedics at the airport. He had landed at SFO more than 5 times per year since 2008. He had landed on both of the 28's before. He had no prior accidents, incidents or violations.

The PM handled the radios. The altitude set at 1,800 feet defined the arc displayed, and the fix for that altitude was DUYET. The PM set the flaps to 30 and the speed to 137 for final approach speed. He saw the MCP speed set at 172 kts, which was for flaps 5, and the actual speed was 170 to 175. When the PF ordered flaps 30, the speed was over the maximum for that setting. He wanted 160 kts before he set flaps 30. After he dialed in 137 kts he opened the landing checklist and selected speedbrake armed. The landing gear was down and three green. He asked the FO if they were cleared to land and the FO said yes.

He called for the landing checklist at 1,000 feet. All items were complete except for the speedbrake. He had flown the Golden Gate 6 arrival, and it was programmed into the FMS by the FO. He also entered the localizer 28L approach. This was briefed during the crew change. The MDA was set to 460 feet (barometric) and he extended the centerline on the FMS once they were on radar vectors. He made altitude callouts based on the altimeter, but he did not refer to

the 460-foot MDA because they were on a visual approach. The MCP approach speed was set to 137 kts.

He could not recall the landing weight. The speed brake was extended during the descent from 9000 to 6000 feet, and after 6000 feet the speed brake was down. It is not allowed to use the speedbrake when flaps are extended. During the approach the first time he saw the PAPI's they were all white and he said they were high, so the PF set 1,500 fpm rate of descent in the autopilot. He recalled seeing two white and two red at one point and saw 4 red at 200 feet. When final speed was set to 137 and the MCP altitude was set to 3,000, which was above them.

Asked how the speed got slow, he said "we set flaps 30, slightly came up, then speed decreased. Above 500 feet there was no reduced speed. We were at normal speed." They intended to maintain 137. The autothrottles operated but "at around 200 feet I think there was no autothrottle. It did not work." He expected them to work and he did not know why they did not. At 200 feet he assumed the autothrottles were still working and providing speed protection but when they reached 200 and the speed was still going down he realized "it was not working somehow." Asked if either pilot touched the throttles, he said no. Asked again if he had his hand on the throttles, he said the PF had his hand on the throttles. He did not recall the autothrottle mode but there was no reason for the AT not to work. After setting TOGA the airplane impacted the wall and he could not control the airplane anymore, and he did not recall what he did with the thrust after that.

He did not remember the AT mode. He advanced the thrust levers either manually or using TOGA and it was a simultaneous push forward so he did not remember if he hit TOGA. He used his hand because he was in a hurry. He heard a sink rate call from the FO but they were still high and the sink was just 1,000 or 1,100 fpm. He tried to correct the flight path but at 500 feet they were below the descent profile. He would not speculate as to whether there was a mechanical failure of the AT. He did not recognize any AT off indication and did not hear any aural indication that the AT was off. Asked if he thought the AT was disconnected during the descent somehow, he said in manual flight AT use is recommended, so AT's were on.

Lee Kang Kuk, the accident PF, had completed 10 flight legs before the accident flight. He had flown to Los Angeles, London, and a short flight to Japan. The accident flight to SFO was the PF's third long flight.

The PM discussed his recent activities. On July 1 he flew from New York to Incheon and was then off duty. On Wednesday July 3 he arose at 7 or 8 am and stayed home all day reading manuals including the FOM. He went to sleep about midnight. On Thursday July 4 he woke up at 0600 and went to the company. He did joint CRM training from 0800 to 1600 in Seoul at the Asiana training facility. He came home around 1700 and went to bed at midnight.

On Friday July 5 he woke around 0700 or 0800. He read the newspaper, ate breakfast, showered and spent the day at home. In the evening he picked up his wife from music lessons 15 or 20 minutes away by car around 2200. He went to sleep about midnight.

On July 6 he woke up around 0800. His sleep quality was okay. He ate breakfast, talked with his wife and son in his dining room and watched baseball on TV. He took a very short nap (15 minute) while watching TV. He left for the airport at 1310 or 1315 and took a bus at 1330. He took a short nap (20 minutes on the bus). He arrived at the airport around 1420. He changed clothes into his uniform. The briefing started at 1440. His duty period normally started one hour 20 minutes before departure. This flight was a training flight so report time was 1:50 before flight.

He was in the right seat for takeoff and served as the PM. After 4:15 he went back and took a break, and he rested about 5 hours. He slept about 3 hours during that time. He watched movies for 2 hours and slept from 4:35 into the flight until 7:35 into the flight, and then he ate breakfast.

During duty in the cockpit, he ate some Korean style food sam bap, chinese cabbage wrapped in seasoning with rice. He had a cup of black coffee.

During the 5 hour break he just had Korean porridge and no coffee. He ate soup when he woke from his nap. After 9:15 into the flight, he had one more black coffee. This was a total of two coffees thus far into the flight. He went back into the cockpit 9:15 into flight.

He needed 6 or 7 hours sleep to feel fully rested each night. 6 or 7 hours is the minimum he needed. After catching up, normally he sleeps about 7 hours per night when off duty. He had enough rest before he went on duty and he felt alert. He felt normal during the flight and had nothing to complain about. He felt the same way when came up to the cockpit after his rest. This was his first flight as an instructor pilot, so he felt he should be more prepared.

Nothing very stressful had happened in days before the accident and in the year before the accident he had had no problems in his personal life, health, or finances. His health was generally okay, but he was taking medicine for high blood pressure (Amochai Tan), 1 per day in the morning. He had been taking it since December 2012. He had experienced no side effects. It was an orange pill. He had had no other health issues and no illnesses in the week before the accident. He had no symptoms of illnesses during the flight. He had no restrictions on his pilot medical certificate and wore no glasses or contacts.

In the three days leading up to the accident, he took a non-prescription product from GNC that had some ingredient that was good for the liver. It was called milk thistle. He took one of those every day in the morning after a meal. He took just the milk thistle and blood pressure pill each day and sometimes an omega 3 pill. He did not recall taking any alcohol because he rarely drank.

During takeoff, climb and cruise, he did not find any problems with PF's proficiency. When the approach started, it was kind of a late response for the flight conditions, but he thought the PF was okay and aware of the procedure. He was using speed brake between 6,000 and 9,000 but he seemed a little bit nervous about the approach to SFO. After localizer capture he felt that the PF was very late when they were high on final. He was slightly high after 4,000 feet. The PM said he was high, and they needed more descent, so he put in 1,500 feet per minute in the VS. The PM wanted him to take stronger action, but he delayed.

In personality the PF was normal. There was no problem when it came to CRM because he communicated well and coordinated his actions with the PM. The PF would let the PM know before doing something, and after he did something the PM would confirm it. The callouts and responses seemed to be working well.

He had an FAA private pilot certificate but not an FAA commercial pilot certificate. He had used his Korean commercial license to get his U.S. certificate.

He did not use tobacco products

The visual approach to SFO was 1.5 times more difficult than other airports. This was because normally they are doing 28R and 28L at same time. The controllers gave a lot of restrictions on speed and altitude to the pilots because of traffic separation. In the B777 most of time crews did precision approaches and visual approaches were not common. Most captains would use the ILS as a backup to a visual approach, but for the accident approach only the localizer was available because glideslope was out of service. They used waypoints for altitude reference. There was no discussion of building a constant descent profile for guidance on the PFD.

The speed restriction to maintain 180 kts until 5 miles caused delay in changing to landing flaps configuration and added burden to the flight. Asiana pilots knew the approach to SFO is difficult. At Asiana there was some special information on the company intranet and there was a simulator flight to SFO. Every year they train for a special airport during recurrent simulator training. In 2013 it was JFK. In 2012 it was SFO. The company considered SFO a “special” airport.

The captain conducted an approach briefing. They talked about how they often received a left base turn and descended with speed brakes. They discussed that if there were simultaneous approaches to the 28's, they would check for other aircraft. They could not deviate laterally off course, so they should use the localizer. During the landing briefing, the PF discussed descending on profile as soon as possible. He had seen a visual approach with no glide slope and only a PAPI just once in simulator training.

The PF did not go to the hospital. His symptoms were the same as the PM's. The PM did not notice anything in particular between 500 and 200 feet about pitch. There was nothing special because the PF was correcting and he thought that the pitch attitude was okay. The PF had a hard time correcting the flight path. He pitched up, but the airplane did not climb as much as expected. When the PM was asked what made him think the airplane was low at 500 feet, he said “I checked outside at the PAPIs. The PAPI's showed three red one white at 500 feet.”

At 1,000 feet on glide path there were two red and two white lights on the PAPI, but speed was a little bit high. Between 500 and 200 feet the PF was trying to catch the descent profile with 3 red and 1 white lights showing, while correcting descent profile, and he was also trying to correct a little lateral deviation. In doing so, he reached 200 feet and found full red PAPI's. The speed was around 120 knots and the red bar was still below the speed on the airspeed indicator.

His last aviation medical exam was in September 2012. He had no family doctor.



He did not recall who requested the landing checklist, but he remembered doing it.

Asked if there was anything investigators had not asked him about that he thought they should know that could help with the investigation, he said he would like to know whether ATC could have warned them if they were below the glidepath. He was wondering if there was any system in ATC manuals. He did not think there was anyone else investigators should speak to.

Ended at 1730 PM

<b>Second Interview:</b>	<b>Lee Jung Min, Captain, Asiana Airlines</b>
<b>Represented by:</b>	<b>John Dean, ALPA</b>
<b>Date/Time:</b>	<b>July 9, 2013, 1400 PDT</b>
<b>Location:</b>	<b>San Francisco, California</b>
<b>Present:</b>	<b>Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Mike Coker-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun- Asiana Airlines; Shin Dong Hoon (interpreter)</b>

During the interview, Captain Lee Jung Min stated the following:

The captain was questioned about evacuation decision making. He stated that after the aircraft stopped, he needed time to judge the situation. When the cabin manager came into the cockpit and asked him if they should initiate an evacuation, he said “standby.” Then he contacted tower about whether the aircraft was on fire, and the tower replied that emergency vehicles were on the way, so he ordered the evacuation. He was looking for his QRH evacuation checklist but could not open his flight bag. He asked the FO if he had the evacuation checklist so he got it from Bong and read it. After completion of the checklist, he got out of the aircraft via the L1 slide.

The captain was asked how long it was from the time the aircraft came to stop until the time he ordered an evacuation. He said about 20-30 seconds. Within 30 seconds. Asked what was on the evacuation checklist, he said the items were parking brake set, outflow valve open, throttles to idle, fuel control switches off, engine fire switches pull, APU fire switch pull. Asked if he perform all the steps he said he omitted one item, the evacuation announcement through PA, because he thought he had ordered it already through the cabin manager. Another item on the list was informing ATC of the evacuation, but he thought they already knew, so he omitted that. When asked if the cabin crew had waited to initiate the evacuation until he gave the order, he said he thought so, because he had ordered them to standby, and then he ordered the evacuation through the cabin manager.

Asked whether he had any idea how damaged the aircraft was when it came to a stop, he said that he thought damage was severe because dust was swirling out on the right hand side, then he saw the smoke coming by outside the right hand side of the windscreen.

Asked whether he had ordered the evacuation before or after seeing the smoke, he said he saw the dust before he gave the evacuation command, and then after he ordered evacuation he

realized that the dust was smoke. There was a mixture of a dust and smoke. He saw the dust at first, and then white smoke, and then black smoke.

Asked if he had seen the crash on the internet, he said yes, the airplane had hit the ground, ballooned, and then hit the ground again. When asked to clarify if he realized how severe the damage was, he said he thought it was severe because the airplane had spun 360 degrees and he expected that there was some damage to the cabin area. The PM was asked how long it was after the cabin manager asked that he issued the evacuation order, and he said it was 5-10 seconds.

Asked what he was looking for when he was deciding whether to order an evacuation, he said he thought the aircraft had been damaged severely and he listened to the ATC communication that emergency vehicles were on the way and that was why he thought an evacuation was needed. He thought it would be needed, but wanted to confirm with tower. Asked why he did not immediately issue the evacuation order he responded that he wanted to reassess the situation and confirm it with tower. He thought if there was no answer, he would call for the evacuation right away.

Asked how many flightcrew bags were in the cockpit he said there were three flight bags. There was one flight bag located on the right side of the cockpit. There was one suitcase and one laptop bag behind the right seat. There was a cell phone and iPad in the laptop bag, and a wallet, and medications for blood pressure and vitamins.

Asked to describe the stabilized approach criteria for a visual approach, and the altitude at which they should be applied, he said that 500 feet was the final descent point. If the approach was unstable at 500 feet, the crew should make a go around.

Asked when it was mandatory for the crew to make a go around, he said that the pilot had to initiate a go around. When asked how he would know if an approach was stable, with respect to specific criteria, he said the approach had to be on glide path, on speed and on the lateral path. Asked what range of speed was acceptable, he said it had to be +10 and -5 from target airspeed as far as he knew. Asked how much lateral deviation was acceptable he said that during a visual approach the aircraft had to be centered, on the glide path, at the right descent angle. Asked about the acceptable range on the glidepath, he said that two red and two white lights was standard for the right glide path. Three red lights and one white light required a small correction, and if there were four red lights, the crew had to initiate a go around. In addition, if the crew was not sure they could make a safe landing, they had to initiate a go around.

Asked if there was a mandatory stable / unstable callout, he said that the procedure specified that at 500 feet the PM's callout was "500 feet". The PF then called out "stabilized" or "go around." Asked whether the PF could call for a go around whether he was the PIC or not, the PM said that the PF was supposed to be the one calling out go around. Asked whether an FO could call for go around he said yes. Asked whether the PF on the accident flight could have called for a go around he said yes, he was allowed to do so.

Asked whether Asiana's stabilized approach criteria specified a maximum allowable sink rate, he said yes, 1,000 fpm. Asked whether he and the PF made the "500" and "stabilized" callouts

during the accident approach, he said he could not remember. He had checked the condition, but he did not remember whether he said “stabilized”.

The PM was asked if he ever heard an aural low speed warning. He said he did not hear one below 500 feet, but he did hear a low speed warning below 200 feet. When asked what the warning sounded like he said the annunciation was “too low, too low.” He could not remember exactly. Asked whether he heard any other aural warnings, he said no.

Asked to confirm the flap speed limit for flaps 30, he said that 175 knots was the maximum for flaps 30. Asked why he waited until 160 knots to set flaps 30, he said because he wanted to protect against a flap overspeed. Asked what happened in the event of a flap overspeed, whether there was a warning, he said he could not remember.

Asked whether he could recall the FD being in flight level change at any time during the approach, he said that before they were instructed to fly heading 310 ° and maintain 4,000 feet, they were in flight level change mode, and after that they were in VS mode. Asked whether they were ever in flight level change mode after that, he said no.

The PM was asked whether Asiana had a mandatory go around requirement. He said that above 500 feet they were to follow the stabilized criteria published in the manual. Below 500 feet, a mandatory go around should be initiated when the pilot felt they could not make a safe landing. Asked why they did not initiate a go around until they were very close to the ground, he said that below 500 feet corrections were made. Before 200 feet he could not check the speed decreasing, but at 200 feet he checked the speed and saw the low speed. Between 500 and 200 feet the PF corrected the flight path. The PM thought that the autothrottle was in use and maintaining speed, so he was trying to correct the flight path and lateral deviation and not paying attention to speed. At 200 feet the PM noticed that the speed was very low and the PM did the go around.

When asked whether during the approach brief they had discussed who would fly the go around if one became necessary, he said that if they had to initiate a go around, if the performance requirements were not satisfied, the PM would say “I have control.”

The interview concluded at 1437.

**Third Interview:** Lee Jung Min, Captain, Asiana Airlines  
**Represented by:** John Dean, ALPA  
**Date/Time:** July 11, 2013, 1435 PDT  
**Location:** San Francisco, California  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Mike Coker-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun- Asiana Airlines; Shin Dong Hoon (interpreter)

During the interview, Captain Lee Jung Min stated the following:

He was informed that the Flight Data Recorder (FDR) indicated that the airplane had gone into flight level change mode at about 1600 feet during the approach. He was informed that the PF said he thought that was possible but he could not remember for sure. He was asked what he could remember and if he could remember the sequence of events in any greater detail. He stated that he did not see any mode change. Asked to describe what he saw just before the autopilot was disconnected, he said he did not feel any short moment of climb and did not see any mode change. After the airplane was in manual flight, the PM's actions were to push the autopilot disengage button twice. Then he turned both FDs off and then turned the FD back on on the right side. Asked whether he used two hands he said yes, he turned the two toggle switches off at the same. Asked whether there was a delay before he turned the right one back on, he said there was no delay. He was informed that the FDR showed that the right FD was never turned off and it stayed on. Asked whether he might not have turned it off, he said he thought he turned both off at the same time and then turned the right FD on. Asked whether it was possible that because it was a long reach he turned the right FD off and on and then the left FD off, he said he thought that he did both off at the same time.

Asked whether after the AP was disconnected his hand was on the throttles at any time, he said no, not until the go around. The first time he placed his hand on the throttles was at 200 feet. At that time he added power because he saw that the airspeed was dropping.

Asked whether the PF had his hand on the throttle after the autopilot was disconnected, he said that after the PF disconnected the autopilot, the PF placed his hand on the throttle and left his other hand on the yoke all the way down. According to Asiana policy, at low altitude beyond the FAF, it was mandatory to place the left hand on the yoke and the right hand on the throttles, just softly touching them. Even though this was manual flight, the policy was clear. Asked whether he saw the PF's hand on the throttle, he said yes.

The PM was asked if he recalled seeing a bright light outside the aircraft just before or at 200 feet. He said that he never saw any bright light outside the aircraft.

Asked where he was looking just before 200 feet, he said that between 500 and 200 feet he was just looking outside. He saw some lateral deviations.

Asked when was the last time he recalled seeing the airspeed before he noticed that it was low at 200 feet he said just above 500 feet, because in order to confirm the aircraft condition he had to look at the instrument panel and the speed was one or two knots below the Vref speed of 135, something like that. He checked the altitude again and, at the same time, the speed, just above 500 feet.

Asked whether he was authorized to fly the RNAV GPS approach to runway 28L at SFO, he said he thought Asiana was authorized, but he was not sure. Asked whether he considered flying this approach because it would have provided a glide path, he said he could use the RNAV approach as a reference, but at the time he did not consider it.

Asked to confirm whether he had been aware during the approach that flight level change mode was selected at 1,600 feet, he said he did not see that or hear any callout. The PM was informed that the FDR indicated that when the mode went to flight level change there was a brief pitch up and power increase. He was asked if he was aware of that. He said he did not feel anything and the only callout he heard was "manual flight." He did not feel any movement or hear any callout about flight level change. The only thing he thought was that the PF might think they were high and was trying to get the aircraft back on the glidepath in manual flight. Asked whether he noticed the autothrottle transition to HOLD mode, he said no. Asked whether the B777 had an automatic speed protection function when it reached minimum speed, he said there was such a function and he knew about it.

The interview concluded at 1507.

**Interview:** Lee Kang Kuk, Captain, Asiana Airlines  
**Represented by:** John Dean, ALPA  
**Date/Time:** July 9, 2013, 0855 PDT  
**Location:** San Francisco, California  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Mike Coker-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun- Asiana Airlines

During the interview, Captain Lee Kang Kuk (the PF) stated the following:

He had been a captain for Asiana Airlines since December, 2005. His date of birth was [REDACTED]. He was type rated on the A320/A321 and he had been a captain on the A320 from 2005 to February 2013. He had begun transition training on the B777 March 25, 2013. He held an airline transport pilot certificate from both Korea and the USA. He also held type ratings on the B737, B747, and B777. His approximate total flying time was 9,700 flight hours. His approximate time on the B777 was 35 hours. His pilot in command time was approximately 4,800 hours.

His date of hire with Asiana was March 1, 1994. He began his career with the airline as a cadet pilot and underwent *ab initio* flight training at a flight school in Florida. After that he completed a more advanced training program. He was a student pilot for Asiana from 1994 to 1996. He began his training as a B737 first officer in 1996. He did not have any prior accidents, incidents or violations and he had not had any unsatisfactory flight checks.

He had completed recurrent training on the A320 during the second half of 2012 and he had begun B777 transition training March 25, 2013. The training had included one month of ground school, 14 simulator training sessions, and a type rating check ride. After that he had begun his initial operating experience (OE). That had involved 16 hours of OE ground school. To complete OE, he needed to complete 20 flight legs and 60 hours of flight time. He was in the middle of OE when the accident occurred.

His OE flights began with two jumpseat observation flights (a round trip to Che Ju Island and a roundtrip to Hong Kong). After that he began his actual OE flights, which were all roundtrips originating at Incheon Airport in Korea. They occurred in the following order:

1. Narita (NRT)
2. Los Angeles (LAX)
3. London (LHR)
4. Narita (NRT)
5. San Francisco (SFO)

The trip to San Francisco was the accident flight. The PF was asked what he could recall about the events leading up to the accident, beginning with the arrival at SFO.

An hour and 30 minutes before ETA he went to the cockpit. The relief captain and relief first officer had already entered the Golden Gate 6 Arrival into the FMC. He requested the ATIS and reconfirmed with the instructor pilot (PM), and then he performed an arrival briefing.

The flight received radar vectors from the San Francisco VOR. SFO controllers issued a heading of 140 degrees, and maintain 9,000 feet. After that, they gave a heading he could not recall and said to descend to 6,000. Then they asked if he had the runway in sight and he saw the runway and responded that he had the runway in sight. They cleared him to heading 310 degrees, descend to 4,000 feet and cleared them for the visual approach to runway 28L.

He selected the localizer because they knew the glideslope was out of service. After that he set 1,800 feet on the MCP, perhaps at the final approach fix. He set VS 1,000 feet per minute. The PM told him they looked high, so he increased it to 1,500 feet per minute. Then he ordered gear down, because they normally arrive high at SFO, and he commanded flaps 20. During that time they were approaching 2,000 feet and he set 3,000 feet in the MCP altitude because 3,000 feet was the missed approach altitude. That was to avoid altitude capture and an interruption of the descent. Then he ordered flaps 30, but the PM did not do it at that time because the speed was 180 and flap lever speed is 175. After some time, the PM set flaps 30.

At 1,500 feet, the PF disconnected the autopilot and confirmed the indication “FIR DIR,” meaning flight director, was displayed on the PFD. That indicated to him that the airplane was in manual flight. By 500 feet, he saw three red and one white light displayed on the PAPI. That was low, so he pitched up to avoid going below the descent angle. He said he “saw some light and was in blindness for a second.” Then he saw on the PFD the speed was below the grey colored range, which meant that it was below the minimum speed range. Simultaneously, he saw “airspeed low” or “autothrottle” disconnect or something displayed on the EICAS panel, he could not recall for certain, both or either.

At that time, the PM said “go around” and pushed the throttles forward. Then they touched the ground and maybe they turned. After the airplane stopped they were sitting for a second. The PM called the emergency vehicles. Outside the cockpit someone, maybe a female, was yelling “the captain, captain.” The PM tried to turn off the flight control switch and he told the PF “confirm” so the PF said “confirm” and turned off the flight control switch. Right after that the PM pulled and rotated the fire switch and after that the PF pulled and rotated the APU fire switch. After that the relief captain was yelling “come out quickly,” so the door was opened and everybody got out.

The PF saw the first officer (FO). When the PF came out he saw on the left side the stewardess lying down and stuck between the structure and the escape slide which was already inflated fully. The FO pulled the escape slide and the PF yelled to her “pull back, pull back.” The PF pulled maybe her left leg, but the right side was impossible to free because the upper part of her legs was stuck. He pulled out the cart and found a fork and tried to puncture the slide with it, but it did not work. He went out and a firefighter gave him a big knife and he came back to the slide and he saw the fire starting. By that time, the stewardess had disappeared. After that, he saw the aisle, but he could not see because of the smoke. It was half and half, visible and invisible, he ran through it and nobody was inside, so he went out. He exited through a rear exit on the left side of the airplane. He was not sure which one.

After he exited, a flight attendant told him four cabin crewmembers were missing. Firefighters were installing a police tape line, so he went over to that side and reported it to the firefighter and some firefighters ran into the airplane, despite the presence of flames on that side of the airplane. It was very astonishing and impressive. At that time, he went just outside the tape line, about 100 or 200 meters away from the airplane. He was together with the other two captains. The first officer had joined the passengers because he got hurt.

He did not know how long he stood outside the airplane. He was taken away in a shuttle bus with the last passengers. They took him to a transit lounge at 91B. Several times he was asked if he was okay and someone checked his blood pressure. The FBI came to him and asked him about the situation and he told them he would only speak to the NTSB. They asked if it was criminal or terror or something and he told him he thought it was a flight procedure or flight condition thing, not terror. Next, two more FBI agents came to him and said they needed his professional opinion about whether the situation involved terrorism. He replied that as a captain he thought it did not seem like terror. He left the airport at nighttime. He was not sure what time.

Asked whether he received any medical assistance, he said that someone checked his blood pressure, but otherwise he refused medical help. Asked whether anyone took blood or urine samples from him he said no.

Asked about the contents of his arrival briefing, he said he briefed a visual approach. He briefed that the approach speed was 137. Asked whether there was anything other than normal checklist briefing items, anything in addition that he discussed about this particular arrival, he said that from the Incheon departure, he had studied a lot because he was under training. The RVRT was inoperative and a flaperon seal part was missing so he had loaded 5,000 pounds more fuel because of that. There were a lot of NOTAMs for San Francisco, and everything was special for him. He did a thorough briefing because it was a training flight.

Asked whether he briefed any special features of the SFO arrival and approach, he said that SFO is a special airport and the pilots were well trained by a company computer system on special requirements. He had received special training on the approach procedures for SFO. He also knew about San Francisco because he had been there many times as a B747 FO. He knew it and was very accustomed to it. SFO approaches were famous for being high, and everyone knew about it, but that was nothing special. It was a general thing for them. Asked why the arriving airplanes were brought in high by ATC he said he did not know. Asked how he planned for that, he said normally they lowered the landing gear and used the speedbrakes and that was normally very effective. It was enough.

The PF was asked if he lowered the landing gear or used the speedbrakes to assist him during the accident arrival and he said yes, between 9,000 to 6,000 feet. When he heard the controller say from 9,000 descend and maintain 6,000, he set 6,000 and pushed flight level change and right after that he used the speedbrake. That was the procedure. Asked whether he used the speedbrake after that he said no because it was dangerous to use it at low altitude. He just lowered the landing gear. He could not recall for certain if he used the speedbrake after 6,000 feet.



The previous crew had set up the Golden Gate 6 arrival. He did not recall if the previous crew had set up the ILS or localizer approach to runway 28L. Asked whether he tracked the localizer all the way in, he said yes.

Asked how he decided to select 1,800 feet in the altitude window, he said it was a fix on the approach, DUYET, marked with a maltese cross. As the airplane was approaching 2,000 feet, he set the altitude to 3,000 to avoid interrupting the constant approach.

Asked what he was using for vertical mode, he said that until 1,500 feet he was using the VS mode. After that he disconnected the autopilot so he was manually maintaining the vertical profile. Asked whether the autothrottles were engaged he said that meant nothing because during his time on the Airbus they called it autothrust and it was always in that position. The B777 had an autothrottle system also, but the thrust levers moved. So it was different. Automatic or not, the thrust levers would move by themselves in manual flight, so it meant nothing, but normally it was on the auto condition. It was very convenient and very impressive to him. Asked whether he looked at the FMA after he disconnected the autopilot, he said that he definitely saw "FIR DIR" on the PFD, but he did not know about the FMA.

Asked to clarify whether, after he had selected vertical speed mode and was approaching 1,500 feet, he had tried to select any other vertical mode, he said their procedure was to have the FD turned off and on. The PM turned the FDs off simultaneously and might have turned the right-hand FD back on again. In that case the FMA was gone. He did not see the FMA exactly. That was his guess. Asked whether he made any changes on the mode control panel in terms of selection of any buttons there, he said he did not have to do that because he was hand flying. Such actions were supposed to be performed by the other pilot when he was hand flying. He was very busy, so he did not have time to consider pushing any switches on the MCP at that time. The procedure was for him to command changes and for the PM to push the MCP switches.

Asked whether he said to the other pilot at any time vertical speed or flight level change, he said he only called the speed thing, because the speed depended on the flap condition. So at 1,500 feet he might have ordered the final speed or something. That day, the PF was focused on the vertical profile so before he mentioned about speed, the PM gave him everything and was very helpful.

Q: What I'm trying to talk about, I'm going to be very candid with you is, you use vertical modes all the time during the arrival

Q: You're using the autopilot

A: Yeah

Q: and you said you selected level change?

A: Uh, I did once. Flight level change.

Q: And that was up high

A: Uh no, during the vertical speed time. I thought or I actually did, I don't know. So because of handling the altitude, the vertical profile I was thinking of pushing the flight level change, the pushbutton, but actually I did or not, I don't know, I don't recall. Yea.

Q: Okay, so that's important though so I'd like to ask you to kind of concentrate and really think to the best of your ability about that. Somewhere during the approach phase, during this progress that you're talking, and you were in vertical speed, but there is a possibility that you may recall

thinking about using flight level change and if you can help me think about that a little bit. When was that? Think about whether you might have selected it or you were thinking about selecting it or did you select it?

A: If I did it, the flight level change mode is very dangerous because the missed approach altitude was 3,000 so the airplane going up again so maybe I gave up, maybe I gave up the idea. I may not have pushed the switch I may be not. This is my memory, not clearly I recall that's the action.

Q: So I think you said you maybe did not do that?

A: Yeah. I maybe did not do that.

Q: So what I'm trying to get to is maybe you did.

A: Maybe I didn't, yeah.

Q: But you're not sure.

A: I'm not sure. I don't recall exactly.

Asked what would have happened if level change had been selected with the altitude set above the airplane, he said the airplane would have climbed and power would have increased. The vertical profile would have been totally interrupted.

Asked to explain what Asiana's policy was on mandatory go-arounds, he said that at 500 feet the airplane should be stabilized, and for a visual approach the airplane should be stabilized by 300 feet. For an unstable condition, they should do a go around.

A very important thing was that the go around should be done by the PIC. Only the captain or captain instructor pilot could do the go around. That was the policy because the company had had a tailstrike where a first officer did a go around, so it was against company regulation.

Stabilized approach criteria were speed +10/-0 or -5 knots and vertical speed should be within 1,000 feet per minute by 500 feet. The localizer should be within a half dot and glideslope should be within a half dot as well. Asked whether a go around had to be performed if any of those things were out of limits at 300 feet, he said yes.

Q: As you were approaching 300 feet and you were looking at the situation did you think you were in an unstable condition?

A: At that time, at 500 feet was definitely 3 red 1 white, so within the limit. And, but airplane the after that, the, I was in the blind for a second, and when I saw the airplane the I don't know. Before that, the airplane, to protect the airplane to go more descend below the three red one white condition I pulled the airplane pitch up. And after that, I saw some light and after that I saw the speed tape and the speed was a grey band area and I saw the EICAS and I saw the captain doing the go around procedure right after that.

Q: You mentioned earlier and you mentioned again a moment when you were blinded by some light? Did you say that?

A: Yeah.

Q: Where was that light coming from?

A: It come from there was the visual conditions so I saw the outside and inside together that time maybe when I saw outside I saw the light.

Q: So looking outside it was very bright?

A: Yeah very bright. It's like a beam. Not the spread the light it's like a beam or something like that. Yeah.

Q: Like the sun?

A: Could be or could be not. I do not know.

Q: So if it's bright light is it just the bright light from the airport and the sun, or some other light?

A: No, not the very near thing a very distant area maybe and very spotted. So uh...

Q: A spot of light.

A: Yea. Not the spread and wide phenomenon, the spotted.

Q: So you saw a spot of light?

A: Yea, yea. A spotted the beam or things like that.

Q: Where was this. Where was it when you looked out. Left, right, straight ahead?

A: Yeah, almost straight ahead, almost straight ahead.

Q: So

A: Right in front of me.

Q: The runway's straight ahead so was it on the runway?

A: On the runway? Not on the runway. Yeah.

Q: But it was a spot of light straight ahead not on the runway.

A: Yea

Q: And it was bright?

A: Yea, it was bright, very bright

Q: And how long did you look at it?

A: Uh, I just saw the light, I just, head like this [looks down], and I uh saw the speed tape and the speed was the grey band and the airspeed low or autothrottle something and it's not that clear that the EICAS message also.

Q: So to be, just so I understand, after you saw the spot of light you looked back in the cockpit?

A: Yea to avoid it

Q: Was it hard to see?

A: Hard to see?

Q: I mean was your vision affected because you used the term blindness.

A: I don't think so.

Q: No? So when you said blindness did you mean that?

A: Yes, the blindness means a very short second. So I don't know the time so

Q: Okay so

A: I just saw the speed tape that's it. I can see right after that.

Q: You saw the speed tape but then after that you couldn't see

A: Couldn't see? I could see

Q: Oh Okay

A: the speed tape yeah.

The PF was asked whether, when he was approaching 500 and 300 feet and looking at sink rate or airspeed or other parameters, he thought that the approach was unstable and he should go around, in light of the company's procedures involving mandatory go arounds. He said yes, the speed was already in the grey band area and the PM did the go around right after he noticed that.

Asked to clarify whether, under company policy, the go around must be done by the PIC, only the captain or the instructor pilot, the PF said "the captain". He added that at that time, he

thought to increase the power, but the instructor pilot was quicker than he was and aggressively pushed the thrust levers forward.

Q: Before you had to do that, when you were still like at 300 feet or something, did you feel you had to go around at that time?

A: That's very hard because normally only in our Korean culture the one step higher level the final decision people he did he decide the going around thing. It's very important thing. As a first officer or the low level people they dare to think about the go around thing. It's very hard.

Q: In your mind, then, and I don't want to put words in your mouth, you tell me, did you feel that as the pilot in the left seat flying the airplane that you had the authority to do, commence a go around yourself?

A: Go around thing. That is very important thing. But the instructor pilot got the authority. Even I am on the left seat, that is very hard to explain, that is our culture. How can I say, during cruise also, when we met the turbulence condition, things like that, easily, B777 go into the maximum airspeed, so that's the limitation. In that case, I never ever thought about that I controlled that condition because instructor pilot handled that, that sort of limitation thing. So that is a, they control the autothrottle system, things like that. I was also the company investigation team also, I know the investigation or the QAR thing, so my experience said to me the regulation and authority is very obvious to me. So, uh, yeah.

Q: And when you say the regulation is very obvious to you, you mean that there is a regulation that says only the PIC can do go around.

A: Yeah, that is obvious to me, but up to now I thought the very dangerous condition, now I am a captain position. I can do that, but it is very hard, yeah.

Q: So just to close this one out, did you expect that only the instructor pilot could decide to go around?

A: Basically, and the regulation, yeah.

Q: On the light that made it difficult for you to see, was that, do you recall if it was above or below the horizon?

A: I don't know.

Q: Okay. And do you know how long you saw it, how long it lasted?

A: Ah, like this second. [Looks down] Like this second.

Q: Okay

A: Yea. Time exactly. Yeah.

Q: Just a brief moment, very quickly

Q: Less than one second

A: Less than one second, yea

Q: Could it have been a reflection of sunlight

A: Yea

Q: Off of something?

A: Yea

The PF was asked how the decision making went to issue the evacuation order. He said he did not know about that. Asked whether anyone from the cockpit ordered an evacuation, he said the cabin crew and relief captain did. Asked to clarify whether they ordered the evacuation, he said he did not recall. Asked how the cockpit door was opened, he said maybe the first officer opened

it. He said he recalled hearing yelling in the cabin. He said it was meaningless to follow proper procedure to open the cockpit door because of the urgency of the situation. The manual said the steps could be performed by recall.

Asked whether he exited the aircraft and then went back inside, he said he exited the cockpit and noticed an exit door was open with a slide deployed outside. He saw a trapped flight attendant at another exit, went to a galley, got a fork, returned to the inflated slide inside the cabin, then exited at the 1L or 2L exit, got a knife, came back in the 1L or 2L exit, went to the slide that was deployed inside the cabin, and found that the trapped flight attendant was gone. He then walked down the aisle looking for passengers and exited via a left rear exit.

The PF was asked about the reason for the 60 hour OE requirement. He said it was a company regulation. He did not know if it was a CAA regulation.

Asked whether the company had a drug and alcohol policy, he said yes they had frequent and random tests because one captain had violated the alcohol policy so the government and the company enforced the rule very strictly and the pilots could not predict when alcohol tests would be performed. Asked whether it was company policy to perform alcohol tests after an accident, he said he did not know. Asked whether anyone asked him to undergo a drug or alcohol test after the accident, he said no, nobody asked him.

Asked to confirm where he received his ab initio flight training, he said he received it at FlightSafety International in Vero Beach, Florida.

Asked whether he was wearing his shoulder harness and seatbelt during the accident, he said yes, very tightly. Asked about his injuries, he said he had experienced pain in his neck and waist area. Asked whether his restraints performed well and stayed connected, he said he did not know.

Asked whether he had electrical power after the airplane came to rest, he said he did not know. He recalled a grass scent and the cockpit window being partially covered. It was half dark, half bright. He could not recall whether he saw electronic lights inside the cockpit.

The PF was asked if he recalled any of the cabin attendants asking if they should evacuate. He said he heard yelling, evacuation or something. He said he thought they had already started the evacuation very quickly.

Asked to describe his general health, the PF said he ran 2 to 4 kilometers every day. He had been eating yellow rice rather than white rice because the yellow rice was less greasy. He did not eat shrimp because of the cholesterol. He enjoyed eating vegetables. He did not have a family doctor. His last aviation medical exam was in September 2012. He did not wear corrective lenses. He had smoked cigarettes from age 20 to 30, but he had quit when he became a jet pilot.

He did not have any health conditions or chronic medical issues and he did not have any limitations on his medical certificate. Asked whether he took any prescription medication, he said no. Asked whether, in the week before the accident, he took any nonprescription medication, he said no. Even when he had a cold or other illness, he just got through it. Asked whether in the

72 hours before the crash he took any medication, prescription or nonprescription, he said he had not. Asked whether he had experienced any symptoms of illness during the flight, he said no. He could not recall the last time he had been ill. His last use of alcohol was July 5, 2013, when he consumed 250 milliliters of beer.

Asked whether he had experienced any significant changes involving his health, finances, or personal life in the 12 months before the accident, such as a death, a divorce, or a large financial loss, that could be a source of stress, he said “nothing like that.” He added that life was stressful, always stressful, but he could not say any special items. Asked whether there anything recent that could have been a source of stress for him, he said no.

When asked about his daily sleep need when he was off duty for an extended period of time, he said 6 to 7 hours per night. When asked about his normal off-duty sleep schedule, he said 2300 until 0600 or 0700. When asked if that schedule, which suggested 7 to 8 hours of sleep per night, was more accurate than 6 to 7 hours, he said 6 to 7 or 7 to 8 sometimes. It depended on the day. He said that until age 30, he had slept longer each night, but after about age 45, his daily sleep range had been reduced. His daily sleep duration was currently 6 to 8 hours. Asked whether he experienced any sleeping difficulties, he said no. He said he had no problems with remaining awake during the day or falling asleep at night.

The PF was asked to describe his activities in the days before the accident.

On Saturday, July 6, he woke about 0700, went jogging, returned to his house about 0800. He ate breakfast. At 0930, he took a bus to Incheon Airport. He began preparing for the flight at 0930. It was a training flight, so he showed up early. The cockpit crew show time was 1510. He spent almost 6 hours preparing for the flight, checking the NOTAMS, the regulations, and the ETOPS regulations. He first saw the PM (the instructor pilot) around 1440. He briefed everything with him. Pushback time was about 1630 local time. Everything was normal.

The PF had met the PM before at the company’s simulator training facility because the PM was undergoing instructor training at the same time that the PF was undergoing training. That had been in May 2013. The PM was not one of the PF’s instructors at that time.

Q: How did the briefing go with the instructor pilot as far as planning and preparation, did you feel you were coordinating well with him? Did you have any difficulties interacting with him?

A: Normally the instructor pilot got the authority, very strict, but I can say at that time I felt very free. The special thing was the 5,000 pounds of fuel I loaded and I reported to him and he said it was very okay.

He had loaded the extra 5,000 pounds of fuel because the flaperon seal was missing.

Asked when he operated the airplane during the accident flight and when he went on break, he said they took off about 1708 Korea time, he was not certain. He operated the airplane for four hours. At 2108 Korea time he and the captain left the cockpit for a break and the relief captain and first officer operated the airplane for 5 hours, from 2108 to 0208. However, the PF returned

to the cockpit 30 minutes early, about 0138, because it was a training flight and from 0208 on it was his flight.

The PF was asked to describe what food and drink he had consumed during the flight. He said he consumed about 3 or 4 cups of black coffee throughout the course of the flight. Shortly after the flight reached cruise altitude and he had made a PA announcement, both he and the PM had their first meal. He consumed a second meal some time before he went into the cockpit for his second shift, sometime between 0100 and 0138. With that meal, he consumed his last cup of coffee. Normally, his procedure was to have the cabin crew serve him a cup of coffee when he arrived at the airplane, a second cup with the first meal, a third cup with the second meal, and a fourth cup before returning to the cockpit to make the arrival and landing. Asked whether he had another cup of coffee after he went into the cockpit, he said he did not know. He followed the lead of the PM. If the PM ordered one at that time, he would order one too.

The PF said he had two bags with him, one flight bag and one bag containing clothing. Both of those bags were in the cockpit. Asked whether he had a cell phone with him, he said yes, it had been in his pocket.

Asked how rested or alert he felt during the accident flight, the PF said that sleeping in the airplane was very hard. He felt tired. Asked whether he slept during his five-hour break, he said he thought he slept for two hours and was half-asleep, half-awake for three hours. Asked to clarify how sleepy or awake he felt when he departed Seoul, he said at that time it was no problem. Asked to clarify how sleepy or awake he felt during his five-hour break, he said he felt half sleepy and half awake. Asked how rested he felt when he went back to the cockpit just prior to arrival, he said he felt excited because he had not visited SFO in 10 years. His last visit had occurred in 2003 when he was a B747 first officer. Asked to clarify whether he felt alert or tired, he said yes, alert.

Asked how many times he had flown into SFO before, he said he had flown into San Francisco many times as a B747 first officer between 1999 and 2003. Asked how many times he had landed the B747 at SFO himself, he said once or twice. Asked how difficult it was to make a visual approach to the 28 runways at SFO, compared to other airports, he said that when he was a B747 first officer, the captains were reluctant to give the flight controls to a first officer because SFO was a special airport, so he had only landed the B747 twice at SFO, during cargo flights. He remembered that a captain allowed him to do an autoland using the runway 28R ILS approach. Asked whether he had ever landed manually at SFO, he said yes, once. Asked whether he had ever landed at SFO in any other airplane types besides B747, he said no.

The PF was asked whether he found the accident approach easy or difficult or in the middle. He said it was very stressful, very difficult to perform a visual approach with a heavy airplane, always. From the planning phase it was very stressful because the glideslope was very, very helpful to making an approach. He knew the NOTAMs said it was out of service, but everyone else had been doing the visual approach, so he could not say he could not do the visual approach. That had been "a very stressful factor". Asked whether he was concerned about his ability to perform the visual approach, he said "very concerned, yea". Asked what aspect he was most

concerned about, he said, “the unstable approach”. He added, “exactly controlling the descent profile and the lateral profile, that is very stressful.”

Asked whether he had discussed that at all with instructors, he said yes. He said that during ground school, they would discuss the approach to SFO during tea time and how it was high. Asked how he felt the approach had been going during the accident flight down to the 300 foot point, before he noticed that the airspeed was in the grey, he said that was a hard question. He said the approach itself was difficult, so every part was stressful. He could not single out a particular part. Even landing and taxiing to the gate was stressful, because it was very busy and the controllers were very busy and spoke quickly.

On Friday, July 5, he was off duty. He could not recall what time he woke. He visited with a neighbor and discussed routine matters. He engaged in routine activities at home. He went to sleep around 2200 or 2300 because he had a flight the next day. He slept 8 or more hours. The quality of his sleep was good. He felt rested when he woke in the morning on July 6.

On Thursday, July 4, he flew a training flight to Narita. He could not recall what time he woke. The flight to Narita started about 1500, ended about 2200. He arrived home about midnight. He could not recall exactly what time he went to sleep.

On Wednesday, July 3, he could not recall when he woke or went to sleep, or what his activities were. He was off duty in Seoul. It was an ordinary day.

The PF lived with his wife and two children, ages 17 and 16.

Asked to describe the personality of the PM and his style as an instructor, and whether it was easy to get along with him, the PF said it was the first time he had flown with him so it was difficult to say. Asked whether the PM gave him any special coaching, the PF said that the whole flight was coaching. He could not single out anything in particular.

Asked whether the PM gave him any particular advice during the approach other than changing the vertical speed, he said changing the vertical speed was a very special order, but otherwise the PM did not give any special orders. When the PF was asked how he felt about the 1,500 feet per minute order, he said it did not matter because he could manage the vertical profile manually or automatically. Sometimes his colleagues in the cockpit could say their opinion, but a high status person in the cockpit could provide direction. Normally he would not object. Asked whether, even though he did not object, he felt 1,500 feet per minute was okay, he said yes. Asked whether he felt the PM was adequately supporting him and backing him up, he said yes.

The PF was asked if he had been through CRM training and he said yes, frequently. Asked how he felt CRM factors, such as planning, decision making, use of standard operating procedures, challenge and response, inquiry, advocacy, and assertion, and teamwork, were being managed between him and the PM during the accident flight it was working out pretty well, he said yes, pretty well. Asked whether Asiana had a policy encouraging junior pilots to speak up if they felt uncomfortable about something, he said yes. Asked whether that was in the manual or taught in



training he said he did not know. Asked whether if he felt there was something unsafe going on during the flight he could bring that to the PM's attention, he said yes.

Asked whether he had had an opportunity to see the PM fly the airplane, the PF said no. Asked whether the PM seemed alert during the approach, the PF said he was "very natural." He added, "Normally the instructor pilots are very alert, there is something how can I say, very alertive. Sometimes too much stressful, but he was very natural. Can say it like that way."

Asked whether the PM was fairly relaxed and did not make him feel stressed, he said he did not know because it was the first time they flew together. Asked whether other PMs seemed more "alertive" or "high key" or on top of things, or active, he said yes. They were more active and touching the instruments. Asked what the PM seemed to be doing that was different during the approach, the PF said it was hard to say because PF was flying and it was double workload, so he could not see the PM and check him.

Asked whether he had discussed with the PM doing anything special to compensate for the increased difficulty of the visual approach, he said he did a briefing like that during the descent. Asked to clarify whether he had asked the PM to back him up or do anything special, the PF recalled that the PM had just said it was okay.

Asked whether the flight had been routine prior to the arrival at SFO, the PF said yes.

Asked whether he had ever had to take the controls away from a captain because they were not seeing something or confused or disoriented, he said "no, no way." Asked if he could imagine a situation where he would ever do that, he said "no way."

The PF was asked if his schedule was pretty typical in the month before the accident, and he said that he had just begun flying again on June 15 when he began his OE. Normally he had 2 or 3 days off between flights, but he had been given 6 or 7 days off before his flight on July 4 because of a schedule change.

Asked whether he gave his approach briefing using the checklist, he said yes. Asked if that checklist included briefing the go around procedure, he said yes. Asked what it said, he said it said go around procedure review. Asked whether configuration callouts were included, he said normally in case of a go around they push the TOGA, put the power up, set flaps 20, and at positive rate select gear up. Asked whether they included a backup approach in the briefing, he said yes they did, like the simultaneous approach to runway 28R. They briefed that for the accident approach. Asked whether they did the ILS or the localizer, he said it did not matter because they were doing a visual approach. They just prepared in case ATC asked them to switch to runway 28R. He could not recall if they set the route 2 page.

Asked whether he asked the PM to extend the final for intercept in the FMS as they were being vectored, the PF said that at final extension he said "confirm." Asked whether they would normally extend the final using the FMS and when he had a heading and cleared approach whether he selected the localizer, he said he could not say whether that was normal or not. That day only the glidepath was out of service, so they used the localizer as an aid.

Asked about the weight that was used to determine the final approach speed of 137 knots, he said he could not recall exactly, it was around 430,000 pounds.

The PF confirmed that he took over manual control at 1,500 feet. He did so by quickly clicking two times the autopilot disconnect button on the control wheel, to avoid hearing the autopilot disconnect warning and he checked the PFD for indication of manual flight. Asked whether he simultaneously clicked off the autothrottles with his right hand, he said he did not know because normally they did not disconnect the autothrottles during normal flight. Normally, the B777 throttle system was moving. It was not important whether it was connected or not because it moved automatically to help them maintain the speed. Even when it was disconnected it moved to control the speed. Asked whether it could be overridden manually by the pilots, he said yes.

Asked to describe the grey band he observed on the airspeed indicator, he said he saw light grey on the speed display. He saw a white-grey band and a triangle. He did not recall seeing the barber pole. He recalled seeing a light grey band on the lower portion of the airspeed tape.

The PF was asked whether he was the one to initiate a go around during flights in the training simulator and he said yes, a lot of times. Asked whether during the accident final approach whether he recalled any EICAS messages, such as messages involving airspeed or beeps, he said he did not recall any beeps. He saw the EICAS. He was not sure whether it was airspeed low or the autothrottle. He did not know.

Asked to clarify his earlier statement that the evacuation checklist was meaningless because you could go by memory for some items, he said it was an urgent situation because everybody was yelling and one did not have to think about it, it was definitely an evacuation. The captain's order was not important. Even the cabin manager who was low level status could do the evacuation because the cabin situation was very serious.

Asked whether, when they were on a heading of 310 at 4,000 feet on a heading to intercept the localizer, and they armed the localizer, whether it was quick capture of the localizer, he said he could not say. The LNAV magenta line was well before the localizer capture so a shifting occurred that day. So that day with the visual approach, the lateral tracking was very important. Normally in the FMC, the magenta line localizer capture and tracking line were almost the same, but that day the localizer capture occurred on the FMA, changing from white to green, before the magenta line on the course. He recalled the localizer capture during the turn.

Asked whether he had any mileage estimates, such as DME, he said every time he was calculating that. However, he did not recall the DME distance when localizer capture occurred. After localizer capture, he began to descend, and that was when he went to vertical speed. Asked when he lowered the gear, he said it occurred after localizer capture but he could not recall at what altitude exactly. He clicked off the autopilot at 1,500 feet just after he set the altitude to 3,000 feet. Asked whether he had one hand on the control wheel and one hand on the autothrottle, he said sometimes yes, sometimes not because it was a heavy airplane and sometimes he needed both hands on the control wheel. They were descending on a visual glidepath looking at the PAPI.

Q: Do you recall where the throttles were positioned? Were they at idle?

A: Not this time, because the altitude was a little bit high, so the throttle system was at the end of down.

Q: Okay, at idle?

A: Yeah at idle. I think that we don't have a chance to move the throttle system. Yeah.

Q: Okay, so we're diving down, 1,500 feet, diving down, we're descending, 1,500 feet, we click off, you click off the autopilot, you set your missed approach altitude. Still feel you're a little above the glidepath you want at that point?

A: Yeah still.

Q: Under manual control?

A: Yeah.

Q: Is this where you talked about earlier you sort of considered using flight level change?

A: Yeah, maybe, maybe at that point I'm considering that, flight level change, but right after that I throw it away, that thought, because very danger.

Q: I understand that, but why, why did you even consider it? I mean, you thought it might be helpful for some reason?

A: Because the VS gives only 1,500 feet per minute, but flight level change give me more than that.

Q: Okay, the throttles will in flight level change

A: Always the end

Q: will come back to idle?

A: Yeah come back to idle. But VS sometimes, throttle is moving.

Q: I understand okay. So if the, do you recall, if you were in flight level change and the throttles were at idle, the throttle position is in hold on the FMA, and you have control of the throttles?

A: Yea

Q: You can move them

A: Yea

Q: Would you expect when you got to your level at flight level change then the throttles would come back up? I'm trying to make sure I understand your understanding of flight level change in vertical speed. What were you expecting the throttles to do?

A: When?

Q: During this descent that you have, you're in vertical speed, and are you expecting the throttles to come back up, they're all the way at idle

A: Mm-hm

Q: Are you worried about the speed at all? Are you considering the speed or are you concentrating on your vertical glidepath?

A: Yeah

Q: Are you thinking the airplane will sort of manage the speed after you capture the glidepath you want?

A: Your question is very complicated...

A: That is a technical problem. At this time I can say the capture the altitude and I set the speed, then throttle will maintain the setting speed. It will move.

The PF was asked to provide his recollection about when, under 1,500 feet, he and the PM realized that they were a little below the glidepath and he applied a little backpressure to the

control column. He said yes, around 500 feet when he saw the three red PAPI lights he flared up, because he was going beyond the limitation. Three red could easily go to four red, so he pulled the airplane up from that point. Asked whether he did anything with the throttles at that point, he said he did not know. He said he did not know, he could only remember that he saw the three red lights and made a pitch correction. Asked if he recalled the FMA at that point, he said it should be blank because the airplane was in manual flight at that time. Asked whether the FMA for the throttles said "hold" he said he did not know.

Asked at what altitude he saw the bright light outside, he said he did not know. He did not have time to say a word. To avoid any hindrance he concentrated on flying the airplane.

Asked whether he noticed any lateral deviations that required correction below 500 feet, he said no, the winds were very light.

Asked whether, during his normal training, whether there was approach to stall or stall recovery training, he said yes, every time. They did it routinely during the training profile. During simulator training, his simulator instructor demonstrated it and he was astonished because the instructor demonstrated that the airplane recovered itself from an approach stall. The airplane pitched nose down and recovered itself. Asked whether he ever did any stall training in manual flight, he said yes, he had during simulator training. From 10,000 feet, speed normally 250 knots, they did a steep turn, power to idle, manual disconnect in idle, depending on speed, flaps 15, 20, gear down, and sometimes flaps 30. Then they held the altitude until stick shaker occurred and then pushed the power. This was an approach stall at low altitude, so they just maintained the pitch.

Asked whether the go around procedure was discussed during the approach brief, in terms of who would fly it, he said they did not discuss it because always the PIC would fly the airplane. Because of the company's accident experience, it was company policy. The PF remembered it because he had investigated it and made a report. The accident was in Osaka, Japan. It involved an A321 tailstrike. The first officer had initiated the go around. The PF was an A321 simulator instructor, flight instructor, and ground school instructor at the time, so he had instructed all the first officers to not go around, always the captain should do that. The PF had taught abnormal procedures for A321 and was an aviation security instructor for all of the pilots. Asked during what years he was doing that, he said he was an instructor from 2008 to 2012. He was doing all three instructor roles simultaneously. He had also served as an accident investigator. He had not been a chief pilot, check pilot, or manager at Asiana.

Asked whether he felt any throttle movement at 500 feet he said no. Asked whether he had his hand on the throttle below 500 feet, he said maybe sometimes on, sometimes off. It depended on the situation, controlling the vertical profile. He did not recall the throttle movement. Asked whether, when he reduced the descent rate, the throttles had increased to maintain speed, he said he did not understand the question. He said that if he selected flight level change, that would have interrupted the vertical profile, and he did not know how he would solve that problem. He said the power was on to maintain the speed. Asked whether he remembered the color of the PAPI lights just before the go-around, he said he could not recall.

Asked whether he pulled back with one hand or two hands on the control column at 500 feet, he said he could not recall. Asked whether the autothrottle was moving at the time, he said it was meaningless. He said the autothrottle always maintains speed, so he did not think about that, but in case of manual throttle condition, he should maintain it. So depending on the speed and the vertical profile, he would use the throttle that way. Asked whether, below 500 feet, he remembered the autothrottle moving, he said he did not know. Asked what was displayed on the PAPI between 300 feet and 200 feet, he said he did not know because his next memory was seeing the white-grey band and seeing that the speed was low and the one thing he could do was go around, but before he could do it the PM aggressively pushed the throttles full forward.

The PF was asked whether the FO was present when he was trying to use a fork to poke the slide that had deployed inside the cabin and he said that he did not know. His memory was that FO tried to wear the protective breathing equipment (PBE), so seeing him like that, he was not sure. He was also trying to do something perhaps. Asked whether he saw the first officer when he went back in the airplane, he said no. Asked whether, when he came back in, the slide that had trapped the flight attendant had deflated, he said he was not sure but the girl was gone. When he had pulled her leg by the ankle, she was yelling like it hurt a lot, and the whole right leg was stuck. The fork had been useless, so he went out and when he came back she was gone.

Asked whether he was familiar with an aural low speed warning sound on the B777, he said he was definitely not familiar with it and he did not know about it. Asked whether he heard an aural low speed warning he said no, he heard no sounds.

The PF was asked the name of the PM for his last flight to Narita, and he said it was Oh Cheol Woo. On that flight the PF flew the airplane over and back. Asked whether he recalled anything unusual about the flight, he said he had one memory, that it was stressful because it was training. Asked what was stressful about the training, he said that in any airport, he could not give a dangerous factor. The dangerous factor was the human being inside the cockpit. Asked whether there was some reason in particular that the Narita flight was stressful, he said that preparing everything from the beginning and the internal pressure to perform without error caused stress.

Asked to confirm the flaps 30 speed limit, he said it was 175 knots. He was asked how slow he thought the PM should let the airplane get before the PM selected 30 flaps. The PF said he was busy during his job, so he was not sure how long the PM waited. It had been the PF's mistake to call for flaps 30 when the airplane was going too fast.

When asked about the throttles on the airplane, whether he could move the throttles himself, he said yes. Asked whether, if he moved the throttles manually, the autothrottle would resume functioning, he said the autothrottle would resume functioning to maintain the speed by itself.

Asked whether if one got down to very slow speed in the A320/321, and turned the autopilot off but still had autothrust and the airplane got down to the alpha floor, what would happen, he said the autothrust would go to TOGA power. Asked what the B777 autothrottles would do in the same situation, he said the autothrottles would do the same thing.

Asked how confident he felt about his knowledge of the B777 autoflight system just prior to the accident, he said he was not so confident because he felt he should study more. Asked whether he had been studying and did not feel confident or he had not had enough time to study sufficiently, he said he did not know if he had studied a proper amount, he had just followed the company program. Asked if he felt he was still learning how the system worked, he said every pilot should study every day.

The PF was asked why he thought the airplane got slow on short final at 200 or 300 feet. He said he did not know.

Asked how he felt about the safety culture and safety management at his company, he said the manager of the training team was famous and he had studied a lot. He encouraged people to do well and keep to the rules. Asked whether he felt that management was safety oriented and wanted to find out about safety issues and address them quickly and properly, he said it was hard to say because that was a management thing.

The PF was asked if he had been involved in any review groups that had looked at the ASAP or FOQA system examining the safety of the A320/321. He said yes, but they commonly referred to it as QAR, because more pilots understood that term.

Asked whether there was anything he had not been specifically asked about that could help investigators understand the circumstances of the accident, he said no. Asked to clarify whether he would intervene if the captain was going to fly the airplane into a mountain, he said the captain would avoid the mountain and if the captain did not, the first officer should do it. It was common sense.

The PF stated that his final comment was that he was happy that the NTSB was investigating the accident, and everyone believed in the NTSB's findings.

Asked if there was anyone other than the flightcrew who should be interviewed, he said no.

The interview concluded at 1232.

<b>Second Interview:</b>	<b>Lee Kang Kuk, Captain, Asiana Airlines</b>
<b>Represented by:</b>	<b>John Dean, ALPA</b>
<b>Date/Time:</b>	<b>July 11, 2013, 1630 PDT</b>
<b>Location:</b>	<b>San Francisco, California</b>
<b>Present:</b>	<b>Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Mike Coker-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun- Asiana Airlines</b>

During the interview, Captain Lee Kang Kuk (the PF) stated the following:

The PF was informed that the FDR indicated that level change had been selected at 1,600 feet, that there had been a momentary pitch up, that the throttles had started to advance slightly, that the autopilot had disconnected at 1,500 feet, and that the throttles had reduced to idle. He was asked to recall whether he had pressed the flight level change button. He said he had disconnected the autopilot because he was high in order to maintain the descent profile, but his memory was vague about whether he had pushed flight level change. He could not recall that. Asked whether he could have pushed the flight level change button by accident, he said that after autopilot disconnect, pushing any mode on the MCP was meaningless because he was in manual flight. Asked whether it was possible that he pushed level change and then disconnected the autopilot, he said it could be or it could be not, but in either case it was meaningless because he disconnected the autopilot. Asked whether he recalled the PM pushing level change at 1,600 feet, he said he did not know, he was busy with his own tasks. He could not even recall whether the PM had contacted the tower or not because that was the PM's job.

Asked whether, to his understanding, if he had been in vertical speed mode and level change was selected somehow and he had disconnected the autopilot, the autothrottles would have been affected, he said he did not think so because he had learned that on the B777 the autothrottle system was always working. Sometimes if the pilot wanted, they could disconnect, but to him it did not matter because in that situation, he could control the airplane manually and in power and speed the autothrottle would maintain the speed always, or, if not, he could back up the speed manually, so it was meaningless to him. The A321 was different, the position was always the climb detent position. They did not move the A321 thrust levers. It was a different concept, the Boeing and Airbus lever systems.

Asked whether, when he was flying manually, his right hand was on the thrust levers, he said sometimes and sometimes not. The B777 was very heavy, so sometimes he had to use both hands on the control wheel. In a controllable and very stable condition, his hands normally went to the thrust lever to back up any emergency condition. Normally, if the airplane was trimmed, his hand was on the thrust levers about half the time. Asked whether he could remember when his hand was on the thrust levers during the accident approach he said no. Asked to clarify whether he thought thrust would be controlled automatically if he selected level change and then disconnected the autopilot, he said the autothrottle system would still work unless he manually disconnected it.

The PF was informed that the FDR did not capture the right-hand flight director being turned off during the approach. Asked whether he could recall seeing the PM turn both flight directors off and on simultaneously with both hands, he said he could not recall. Asked whether he was confident that the PM turned the right flight director off and on or left it on all the time, he said he was not paying attention to the PM because he was a high status person and the PF was completely relying on him to perform correctly. He did not think the PM could be wrong. He could vaguely recall the flight directors being turned off and then on. In the PF's vague memory, the PM turned both off and then turned the right FD back on.

The PF was informed that at low altitude the control column was pulled back hard during the last 200 feet, and he was asked if he recalled pulling back with a lot of force. He said that he had seen at 500 feet the three red PAPI lights, so he had pulled back to prevent seeing four PAPI

lights by basic instinct. Asked if he recalled having to use a larger than normal amount of force, he said that the airplane was very abnormal to him. The A321 was using a sidestick and the wheel system on the B777 was very heavy to him. It generally felt heavy. He did not know how much he pulled back during the accident approach. He just pulled back continuously.

The PF was asked whether, after he was in vertical speed and approaching 2,000 feet, he set 3,000 feet in the MCP altitude, he considered pressing level change but decided not to, and then at 1,500 feet when he disconnected the autopilot he thought the autothrottles were working normally. He said he did not know. It was a continuous descent and they were high, so the thrust levers were at the full back position, so he did not know why they would come out of idle power at that time. Asked whether he recalled any of the FMAs on the PFD, he said he recalled that after he disconnected the autopilot "FLT DIR," but the other modes were meaningless to him because he was on the visual approach and did not focus on them because of his workload.

The PF was asked if he heard any EGPWS warnings during the approach and he said no.

Asked to clarify whether he could add anything to his description of the bright light he saw on short final, he said he could not. Asked whether he could recall the color of the light, he said no.

The PF was asked where his visual attention was focused during the approach, he said that it was focused on everything outside, the runway, the beginning of the runway, the end of the runway, and his peripheral vision, because it was visual. Asked whether between 500 and 200 feet his eyes were focused on the runway, he said that lining up was mostly done, so he was just focused on the descent profile at that time and he was worrying about the PAPI turning to four red lights because that meant he would fail his flight, and he would be very embarrassed if that occurred. He added that four red is a very dangerous situation to a pilot.

Asked where he was looking from the time he saw the three red one white until the point where he saw the bright light and looked down, whether his eyes were out front the whole time, he said not the whole time. His attention was divided. He was looking out front and looking down inside the cockpit. Asked what he was looking at inside the cockpit, he said he was looking at pitch and speed during the visual approach. He recalled pitch was 4 or 5 degrees. Asked whether it was 4 or 5 degrees throughout the 500 to 200 feet, he said yea, maybe.

The PF was informed that the FDR indicated that speed dropped from 135 to 118 between 500 and 200 feet. Asked whether there was anything from a human factors standpoint that could help investigators understand how he and the PM might have missed the decrease in speed, such as being fixated on the runway or assuming that the autothrottle would maintain the appropriate speed, he said that they should have maintained the speed manually in that case. He said he did not know. He would have to think about it. He said he believed the autothrottle should have come out of the idle position to prevent the airplane going below the minimum speed. That was the theory at least, as he understood it.

The PF was asked if he could fly the RNAV GPS approach to runway 28L and he said he was not sure because he was not through with training yet.



Asked whether he wore sunglasses in the cockpit he said no, because it would have been considered impolite for him to wear them when he was flying with his PM. He said it was very important in their culture.

Asked why he pushed the flight level change at 1,600 feet he said he did not push it. He said, why would he push it because he was high. Asked whether the PM might have pushed it he said “no way,” because the instructor was more advanced than he was.

Asked whether he had reconsidered his earlier answer that he might have pressed level change but had reconsidered it and he was not sure, he said flight level change always gives idle power so crews frequently pushed it to descend quickly. It was very convenient and they did not have to think about the descent profile. Asked whether he was still unsure whether he had pushed it, he said that he did not because it would have been crazy to do so. It would have made the airplane climb.

Asked whether the autothrottles worked the same way in flight level change and VS mode, he said that in flight level change they always came to idle for a descent, but in VS they would sometimes be moving.

Asked whether he felt that flight level change would have allowed a quicker descent than 1,500 feet per minute in VS mode, he said he did not know.

The PF offered one final comment. He said that during the investigation he encountered another B777 pilot from United and discussed the situation with him. The PF told him to be careful with the airplane. With a thrust lever that worked like that, everybody could meet the same situation, so it was important to thoroughly examine. He noted that the glidepath was always 3 degrees on an ILS approach, but on a visual approach the descent angle could be higher or lower than 3 degrees. This could affect thrust settings. This was another factor.

The interview concluded at 5:21 PM.

**Interview:** Lee Jong Joo, Relief Captain, Asiana Airlines  
**Represented by:** John Dean, ALPA  
**Date/Time:** July 9, 2013, 1523 PDT  
**Location:** San Francisco, California  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas;  
Mike Coker-Boeing; In Sun Suk -Korea ARAIB; Cho Yong  
Sun- Asiana Airlines; Shin Dong Hoon (interpreter)

During the interview, Captain Lee Jong Joo stated the following:

He was a captain with Asiana Airlines on the B777. He was 53 years of age. His date of birth was [REDACTED]. He had been a captain on the B777 for approximately 7 years, starting in 2007. Prior to the 777 he was on the B767 for 12 years. He had not held any check airman or management positions in the airline and had not taught in the ground school or simulator. He was hired by Asiana Airlines in 1995. Prior to joining Asiana, he had been in the Air Force and flew the F-5A/B Freedom Fighter. He held an airline transport pilot certificate from both Korea and the USA. He also held type ratings on the B747, B767 and the B777. His approximate total flying time was 11,000 to 12,000 hours. His approximate time on the B777 was 3,400 hours. His pilot in command time was approximately 7,000 hours. He had never been involved in an accident or incident. He had never received a violation.

He stated that the only other pilot on the crew he had previously flown with was Captain Lee Jung Min. That flight was two years ago and the destination was San Francisco (SFO). They were both captains on that flight with one of them on the primary crew and one on the relief crew. On that trip they were not flying together in the cockpit and he had never flown with captain Lee Jung Min when both were in a pilot seat.

He stated that he had landed at SFO many times as the Pilot Flying (PF) and that included landings as PF in the B777. The last time he had landed the B777 at SFO was two months ago and he landed on runway 28L. He said maybe two months ago the glideslope for runway 28L at SFO worked and it was operating normally. Regarding any difficulties landing at SFO with approach, descent, landing he stated that the altitude and speed belonged to air traffic control (ATC) and not to pilots. Pilots were very limited and controlled by ATC and it was very hard to comply with those restrictions. On his first flight to SFO, he remembered that ATC kept the aircraft at a high altitude requiring him to lower the landing gear for altitude loss. That was a long time ago. He did not recall anything special at SFO beyond those factors. He had never accomplished a go around at SFO.

He stated that on the event flight he and First Officer (FO) Bong Dong Won, in their capacity as the relief crew set up the airplane for the arrival into SFO. He personally set up the Flight Management Computer (FMC) with the Golden Gate 6 arrival and the localizer 28L approach. He entered the minimum descent altitude (MDA) for the approach of 460 feet. He stated that when the other crew came forward, he told them that he had set the FMC and added some tips and advice for SFO. The advice concerned the high altitude, high speed that was common and that those restrictions must be handled. He told this information to Captain Lee Kang Kuk. He didn't remember entering the reference speed for landing into the FMC but thought that maybe FO Bong did so. He did not recall the actual landing weight. He stated that he checked the

Automatic Terminal Information Service (ATIS) by requesting it through the Aircraft Communication Addressing and Reporting System (ACARS). He did not think the landing crew would face any other problems besides the high altitude and high airspeed restrictions. He was not aware of any problems in the cabin with the passengers or the flight attendants such as anyone being sick.

He did not remember anything about the descent, arrival, approach or landing as he was sleeping while seated in seat 1E. He did not notice anything unusual at all. He did not feel any unusual sensations in yaw, pitch or sink but remembers the engines spooling up before touchdown. He did not remember how many seconds before touchdown the engines spooled up but said there was a spool up and then the airplane hit within a few seconds.

He thought there had been a hard landing and then he felt some yawing. He said there were oxygen masks dropping and luggage from the overhead bins falling. When the airplane stopped moving he tried to put on his shoes but was unable to. He heard the evacuation signal and exited without his shoes. He headed to door L1 and heard someone calling out. He looked at door R1 and saw that one female cabin crew member was trapped between slide and fuselage. He approached her and tried to make some space so she could breathe by pushing the slide away from her but it didn't move at all. He thought about the crash axe. He went to the cockpit, took the crash axe and went back and punctured the slide to deflate it. He used the pointed end of the axe and hit the slide one time and it deflated. He was in such a hurry because he thought the trapped cabin crew member was going to die because she was choking so he poked the slide and threw the axe away. He moved her to L1 door and then her husband showed up and took her out. There were a lot of fumes in the business section and he could not see well in the cabin. He stuck his head outside through the L1 door and saw no passengers evacuating.

He exited the cabin and came down to the ground via the L1 slide. From the ground he saw a male cabin crew at the L2 door who was asking for a knife. He ran back up the L1 slide while Capt Lee Jung Min ran in the L2 door. When he reentered the airplane to look for the crash ax he saw a cabin attendant at the L1 door. It was hard to breathe and the cabin attendant was looking for an oxygen mask. The male cabin attendant found one PBE (protective breathing equipment) and put it on. The cabin attendant tried to go aft in the cabin but after a few steps he returned. He could not see because the smoke was black. He and the male flight attendant exited the aircraft through the L1 door. The cabin attendant removed the PBE and threw it to the ground. He observed Capt Lee Jung Min at the L2 door but did not know what he was doing there. The paramedics then guided them out of the site. That is all he remembered.

The paramedics guided him away from the airplane and they were moved to the area where the passengers were waiting on the tarmac. He thought they were on a taxiway. He could not recall seeing any other crewmembers. He thought they were on taxiway Foxtrot. There was an aircraft, maybe Lufthansa, holding short of 28L waiting for takeoff. He did not talk with Lee Jung Min about what had happened. He did not remember how long they stayed there but they were eventually moved to G gate. He did not remember how long they were at the G gate area but it was 2330 when they got to the hotel. They travelled to the hotel via transportation arranged by the Asiana station, and he thought it was a crew bus. On the bus were three pilots, himself, Lee Kang Kuk and Lee Jung Min, one male cabin crew member and one female cabin crew member. None of them discussed what happened. They were just sitting and looking outside.

During the flight he was only scheduled to be crew during the cruise portion. From takeoff until 1:30 into the flight he ate his meal. He then slept until 4:50 after takeoff when he awoke for the crew change. He was in the cockpit for 5 hours. He thought he fell asleep again right away after the second crew change. He said the other crew looked good after the second crew change. They seemed alert and responded normally to his crew brief and understood what he was saying. There were no problems and they seemed to be interacting normally with no signs of disagreement or conflict. During the crew change, Lee Kang Kuk came into the cockpit first. When asked if he slept well, he replied he had slept enough. Ten minutes later, Lee Jung Min entered the cockpit.

He had not heard anything about how Lee Kang Kuk was doing as a new captain on the B777 or if he had any difficulties.

When asked again about flying into SFO, he replied that from time to time he had the same situation about being kept high on the arrival. He said, most often they were kept high until the turn from base to final. The other half of the time they were kept high until the base descent. When asked what effect that had on him he said it was stressful and affected the difficulty of the approach and the workload. He said that at most of the US base airports ATC kept them high but the intensity of difficulty at SFO is more. In addition to the altitude restrictions they are given speed limitations and that is why it is very hard to deal with. It is the most difficult of the airports he flew into. When asked if he had flown into Chicago (ORD), he said he had but SFO was more difficult.

He said there were visual approach stabilized approach criteria. He couldn't remember what they were but they were associated with an altitude of 500 feet.

He said that he had 3 bags with him on the trip. His flight bag was in the cockpit and he had two bags in the cabin above seat 1E. He did have his cell phone and took it with him.

He said he would use level change for a visual approach below 10,000 feet but would not use it during final approach. There was no way he would use it below the final approach fix because he obviously would be on glide path over the final fix 100% of the time and would never have a chance to use it. He stated that if you move the thrust levers on approach the autothrust will let you override it and then resume when you let go.

He was off duty during the three days before the accident flight. He spent his time doing yard work and gardening. He slept 7 or 8 hours each night. On the day of the accident he arrived at the airport about 2 hours before departure, about 1430 local time, and participated in the crew briefing led by Lee Jung Min who was the Pilot in Command (PIC). The flight was well briefed by Lee Jung Min.

He said he was never asked to take a drug or alcohol test after the accident and did not provide any samples. His health in general was good with no chronic health conditions. He carried in his flight bag prescription hyperlipimia pills prescribed by the Asiana AME (aviation medical examiner). He thought the name of the medication was Chocojung. He had no symptoms of illness during the flight.

He said that anyone can initiate a go around during final approach, not only the captain or only the pilot flying.

He said he had participated in crew resource management (CRM) training twice per year. Two years ago he had participated in a joint crew resource management class with the cabin crew. He said the training was very helpful and the last time he had taken the class was this year in February or March. He said he had training on fatigue one time in a special class conducted by the Asiana AME. That class was in October of 2012.

He stated the pilots he flies with are all standard in terms of following standard operating procedures. He said he didn't know about the safety orientation of the company or whether management is concerned with safety. He said there is a safety reporting system. There were two types, a flight operations report and a captain's report. He said the captain or any crewmember could make a report on a safety issue using the flight operations report. He said you could not make the reports anonymous. He stated that three or four times in his career he had made reports but none of them were safety related.

He said there was nothing else that he could say about the circumstances of the accident that had not already been talked about. He could not think of anyone other than the flight crew that should be spoken to.

The interview concluded at 1656 PDT.

**Interview:** Lee Sung Kil, B777 Chief Pilot, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 29, 2013, 1300 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Capt. Lee stated the following:

He was 53 years of age. He had been the B777 chief pilot for one year 7 months. He was hired by Asiana in 1993. Asked to describe his daily responsibilities he stated that his daily responsibility was to ensure the safety of operations. He directly supervised B777 pilots. Asked whether he set the airline's policies and procedures for flying the B777, he said that the applicable divisions, such as the training division, etc., actually set the policies and procedures. He was in charge of managing those procedures and managing the pilots.

Capt. Lee had not flown with Lee Kang Kuk. He had flown with Lee Jung Min on the B767 about 10 or 11 years before the accident, but he had not flown with him on the B777.

Asked to describe the company's policy or procedure for who could call for a go around, he said that the first responsibility rested with the pilot in command (PIC), but the pilot flying (PF) could decide to do a go around at any time. Asked whether anyone in the cockpit could call for a go around, he said yes, if the circumstances called for it. Asked how this was documented and trained so that all the pilots understood it, he said that the PF reviewed it during every preflight briefing. In addition, the pilots performed a go around in the simulator every year. Asked whether he thought all Asiana captains would agree that a first officer (FO) could initiate a go around, he said yes.

Capt. Lee was told that Lee Kang Kuk had indicated that a pilot might defer to the highest ranking pilot in the cockpit on go around decision making and asked whether that was a correct interpretation. He said that even if Lee Kang Kuk might personally think so, because of his training Lee Kang Kuk would be ready to call for a go around if he realized the situation was dangerous.

Asked whether Asiana had a mandatory go around policy, he said yes, a pilot could call for a go around if not stabilized at 100 feet in instrument meteorological conditions (IMC). A pilot could go around during a visual approach if the airplane was not stabilized at 500 feet. If the runway was not in visual conditions, the PF or PM could call for a go around. Asked to clarify whether there were conditions that required the pilots to go around, he said yes. Asked to describe those situations, he said if ATC asked the crew to perform a go around, if the runway was not in visual and it was impossible to continue the approach, or if the approach was unstable. If the approach was unstable, anyone in the cockpit could call for the go around and it would be mandatory.

Asked whether Asiana pilots were expected to be able to fly a visual approach with no flight path cues, such as a glideslope or vertical path indicator such as a PAPI or VASI, he said yes. Asked what the chief pilot did to ensure that all pilots were able to do that, he said every pilot was very experienced by the time they started to fly the B777. They had a minimum of five years of experience on the B737 or A320. In addition, they were well trained on visual approaches from their domestic flying. They practiced visual approaches during B777 transition training, and they had a simulation training and evaluation every year that included the visual approach.

Asked whether, as part of the company's annual training on visual approaches, they looked to see if pilots were able to land without a glideslope, glidepath, or PAPI, he said they never set up intentionally without a glideslope or glidepath in actual flying. Normally they used an instrument approach above 1,000 feet, but during 80% of their flights, they conducted the rest of the approach manually. Asked to clarify whether they ever did a visual only approach with no vertical path information in simulator training, he said they did approaches in the simulator with no glidepath and no glideslope, but they did have a VASI or PAPI.

Capt. Lee was asked what proportion of landings were conducted by captains or FO's, he said it was about 50/50.

Capt. Lee was asked whether Asiana had a policy regarding when the pilots could use flight level change (FLCH) during an approach. He said there was no requirement, but it was not recommended on final approach. Asked whether Asiana policy allowed visual approaches to be conducted with the autopilot (AP) off and the autothrottles (AT) on, he said yes, they could turn the AP off at 1,000 feet. Asked if it was acceptable to fly with both off below 1,000 feet, he said no, it was mandatory to have the autothrottle on for final approach.

Asked whether the airline had an automation use policy, he said the airline recommended using as much automation as possible. Asked whether the policy specified situations when the pilots should revert to manual flight, he said there was no general guidance, but there were specific situations when the pilots had to revert to manual operation. For example, they might need to do so if the airplane could not maintain speed or height in VNAV with gusty winds of 25 knots or more. In addition, the pilots would revert to manual flight if the captain thought an instrument was misleading him or if there was a fault indication. Asked where the company's automation use policy was documented, he said in the Flight Operations Manual (FOM) and Pilot Operations Manual (POM). The company followed Boeing guidance in this area.

Capt. Lee was asked if pilots got most of their manual flying practice during approaches below 1,000 feet and he said yes, they did visual approaches in the simulator. He said about 50% of real landings were performed manually, with the AP off and AT on. Asked whether Asiana required pilots to keep the AP on until below 1,000 feet, he said they did not have such a policy. During a visual approach they had to turn it off at 1,000 feet. Asked whether they could turn the AP off above 1,000 feet he said yes, but the airline's policy recommended that it be turned off by 1,000 feet. Asked whether they could turn the AP off at 8 miles from the airport and an altitude of 2,800 feet, he said doing that would not be recommended. The airline recommended turning it off at 1,000 feet, but the pilots could turn it off above that altitude. It was permissible.

Asked if he was familiar with the low speed protection function provided by the B777 AT system, he said yes. Asked whether the AT provided low speed protection in all pitch modes, he said it would not provide protection if the thrust was in hold mode, unless it changed to another vertical mode. Asked whether the AT would provide low speed protection in FLCH, he said, it would not provide protection in thrust hold mode unless it changed to another vertical mode. Asked what happened to thrust mode with the ATs armed when FLCH was selected, he said the thrust would be in speed mode. Asked how the pilot would use the automation to comply with an ATC speed restriction in a climb, he said the pilot would select the desired speed on the mode control panel (MCP). Asked how he would maintain a specific speed in a descent in flight level change mode, he said through a speed intervention in MCP mode. Asked where the thrust levers would be, he said the thrust levers would move automatically to maintain the selected speed. The thrust levers would come to idle to achieve maximum descent rate.

Asked if the low speed protection system had gaps where it would not provide low speed protection during an approach, Capt. Lee said it would not provide protection in thrust hold mode. In addition, the low speed protection was not available below 100 feet radar altitude. Asked if there were any other conditions in which it would not work, he said no. Asked whether he thought Asiana pilots had understood this before the accident, he said yes. Asked when it was explained during training he said there was no training about it, but they were aware. Asked where they would learn that information, he said in the Flight Crew Operating Manual (FCOM).

Asked if he was aware of Asiana B777 pilots having particular challenges making approaches to San Francisco International Airport (SFO), he said there could be many other airports that were more difficult to approach. He did not think SFO was especially difficult. New York, London, and Paris had more traffic than SFO. Sometimes, however the controller might give a clearance requiring high altitude and high speed, so pilots could have difficulty on final approach. Asked whether such clearances were unique to SFO or other airports as well, he said there could be many other high traffic airports that were more complicated and difficult, but at SFO the controllers sometimes gave high altitude and speed restrictions that could make the approach more difficult. Asked if this was something the airline was paying attention to or tracking before the accident, he said the airline had never formally complained to SFO, but among the pilots on the fleet they had often discussed it before the accident.

Asked whether Asiana's manuals differed from Boeing's, he said they pretty much followed the Boeing policy. They did not deviate from it much but they had added more detailed safety procedures. He reviewed and improved the procedures in the manuals once per month.

Capt. Lee was asked whether he was notified if a pilot failed a checkride or was found to need extra training. He said that he was given notifications about every training.

Capt. Lee was asked if Asiana received trend information from the airline's Flight Operations Quality Assurance (FOQA) department about unstable approaches. He said FOQA data was managed by the safety team and he did not get any FOQA reports on unstable approaches. They did report violations to him on a quarterly basis, and he could request FOQA data from the safety department for those violations.



There were 260 B777 pilots, including trainees. About 30 pilots were newly qualified on the airplane in 2012.

Asked if airline policy required callouts for FMA changes, he said absolutely yes. Asked if that was true for all FMA changes, he said absolutely yes.

Asked if the role and responsibilities of a relief first officer who monitored from the jump seat were specified in the airline's manuals he said their specific duties were not detailed. They were there to support the other two pilots.

Asked whether he had experienced both FDs off and checked to see that speed mode was activated, he said yes.

Asked how many times incidents similar to the accident scenario (AT going into hold mode without crew awareness) had occurred, he said it had never happened, to his knowledge. This was the first time.

Asked whether, during the accident flight, the instructor captain in the right seat was required to have his hand on the throttle to support the PF and whether that was specified in the airline's policies and procedures, he said yes, it was a written procedure. After the final approach fix, the instructor was supposed to have his hand on the throttle and to intervene if necessary.

Asked whether the airline had crew pairing policies that allowed pilots to avoid being paired with other specific pilots, he said there was no written procedure for that, but sometimes people would make an individual request by phone.

Capt. Lee was asked if he had interacted with Lee Kang Kuk during the time when he was undergoing his first 9 OE training flights. He said yes, they had talked about the flights. Kang Kuk Lee's progress had been normal and his training was going well.

Asked why the company used contract simulator instructors, Capt. Lee said it was because the FAA had recommended that Korean airlines outsource the instruction after they had downgraded Korean aviation to Category 2 following the Korean Airlines accident in Guam. Asked what specific training the contract instructors performed, he said that they provided instruction using established training profiles and they had meetings with the contract instructors to consolidate ideas about the profiles. Asiana instructors provided ground training and the contract instructors performed the full flight simulator training and checkrides. Asked what the checkride failure rate was for the B777, he said the pilots underwent training every 6 months and on average about five or six of them failed.

Asked whether there was anything investigators had not asked him about that he felt would be important to know for the investigation, he said that Asiana would study their operations to see if they could do anything to prevent future accidents. They would not just focus on the pilot or human error. They would need to also look into the tower at SFO. It would need to be thoroughly studied and a thorough investigation conducted.

The interview concluded at 1535.

**Interview:** Yoo Byung Geoun, Manager of Training, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 29, 2013, 1600 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Capt. Yoo stated the following:

He was 49 years of age. His title was the general manager of flight crew training, and he had been in his position three and one half years. He planned the pilot training program and processes and reported the results. He was also in charge of the crew resource management (CRM) and line-oriented flight training (LOFT) scenarios, and Boeing Training Services Korea (BTSK) training. He stated that BTSK conducted 95% of the simulator training. Asked whether the BTSK instructors reported to him, he said yes.

Asked if he was qualified on the B777, he said no, he was a B747 captain.

He had not ever flown with Lee Kang Kuk or Lee Jung Min.

Capt. Yoo stated that Asiana used a total of 145 instructors and about 40 of them were BTSK contract instructors. Asiana had been working with contract instructors affiliated with BTSK since January 2002. Asked why Asiana employed contract instructors, he said he was not sure because he was not a manager at the time, but he thought to improve the training program.

Capt. Yoo was asked where Asiana's 145 instructors came from. He said that most were line pilots. Some were retired captains. Asked whether Asiana selected the BTSK instructors, he said they coordinated with the contract company on that at technical meetings. Asked what else was discussed at the technical meetings, he said they discussed the lesson program for recurrent training every six months. They collected a lot of data from the safety team and instructors on irregularities and discussed that together.

Capt. Yoo was asked for an example of something Asiana had recently changed in the training as a result of that process and he said he could not think of an example. They had changed lots of things.

Asked if he approved the curriculum for initial, transition, and upgrade training, he said yes. Asked what special emphasis areas were most important for the B777 during the captain's transition training course, he said he was not qualified on that airplane, but they followed the international standards from FAA and EASA. Asked if there were any special emphasis training items for all fleets at the present time that were not in place a year ago, he said that in the summer of 2013, they were emphasizing crosswinds and circling approaches.

Capt. Yoo was asked to describe what training Asiana provided to its pilots when it came to flying visual approaches. He said that during B737 captain transition training they did 11 approaches including SFO. They followed ICAO and Korean aviation regulations.

Asked whether Asiana provided any special training to help its pilots understand how to conduct visual approaches, he said they used the Boeing manual. The Boeing Flight Crew Operating Manual (FCOM), Flight Crew Training Manual (FCTM), and simulator sessions were very important.

Asked whether the pilots were required to perform any landings in the actual airplane before flying the line, he said no. They had a level D simulator, and they did LOFT training. In some countries, only the captain had to have a type rating, but Korea required both pilots to be type rated. Their initial training was done in the simulator, but the LOFT training was approved.

Asked whether Asiana trained pilots to understand that anyone could call for a go around, Capt. Yoo said yes, if the pilot monitoring (PM) called for a go around twice and received no response, they could take control. The company had a no-penalty policy for rejected takeoffs, diversions, and go arounds. Asked whether the airline taught pilots that there were times when it was mandatory to go around, he said yes. Asked what was taught, he said they followed the federal aviation regulations with respect to visibility requirements, localizer and glideslope deviations, and stable approach criteria at 500 feet.

Asked how it was decided what was taught, and whether the airline learned from its experience and used knowledge gained from instructors and FOQA to modify training, he said yes they used both sources of information to modify the training. Asked for an example of how FOQA reports were used to change the training program, he said the B767 crews were receiving late clearances resulting in a high rate of descent, so the next time they flew in the simulator they would fly that kind of scenario in recurrent training. They had made a similar situation in the simulator and talked to Boeing about how to prevent and manage those situations. Asked when they had done that for the B767 example, he said in May of 2013.

Asked whether B777 training included a visual approach to SFO he said yes. Asked whether the procedure forced them to be high and fast, he said yes.

Capt. Yoo was asked how Asiana selected instructor pilots from its ranks. He said the operations team recommended the instructors and about half of them were eventually selected. The final selections were made by the training manager and evaluation team. The evaluation team consisted of the general manager and operation team. Also, instructors were involved.

Asked whether he had selected Lee Jung Min as an instructor, he said he was only one member of the team, but yes he was involved. Asked what factors were considered when they were deciding whether to accept him as an instructor, he said they required no accidents or incidents in the last three years and no simulator or check ride failures. Asked whether the team sought recommendations from the B777 chief pilot or from managers, he said yes, from the B777 team

manager. Asked whether anyone on the team had seen anything that had made them think that perhaps Lee Jung Min should not be an instructor, he said no.

Capt. Yoo was asked whether the instructor training curriculum taught who was supposed to make the decisions when it came to go arounds. He said yes. Both pilots could decide if it was unstable or not.

Asked whether LOFT scenarios had been modified as a result of LOSA findings, he said yes. Asked for examples, he said LOSA belonged to the quality assurance team, but they collected the data and applied it to the LOFT program together. Asked when the last LOSA was conducted, he said he was not sure.

Asked whether the airline had had any discussions about automation policy and how it should be addressed in training, he said he would have to look at the paperwork for specifics.

Asked if there had been any issues in recent years that had prompted the airline to adjust the pilot training program to ensure that manual flying skills were being maintained, he said he would have to check with the quality assurance team.

Asked whether, in general, the approach to training the autoflight system varied a lot by aircraft type, he said each type had its own autoflight training. Asked whether the issue of transitioning from Airbus to Boeing airplanes had been raised in recent years as an issue that deserved special attention, he said there were several cases where they had transitions from the Airbus to the Boeing aircraft, but the transitions were good.

Asked whether they evaluated crew resource management skills during simulator training, he said yes. Asked how that was accomplished, he said they had CRM check items and a LOFT program. Asked how they evaluated crew CRM performance, whether the pilots were evaluated on CRM individually or as a crew, and whether the crew could fail together due to poor CRM, he said yes, it was possible. Asked if that happened very often, he said it happened sometimes. Asked if threat and error management was taught in the airline's pilot training curriculum, he said yes. They had a sixth generation CRM threat and error management program (TEM).

Asked what the airline's normal procedure was for the PF, in terms of whether the PF should have his hand on the throttle at 1,000 feet or 500 feet, he said yes, the airline had a policy addressing that. Asked if he recalled what the policy stated, he said it depended on the aircraft type.

Asked if there was another policy requiring an OE Captain or a Training Captain to keep their hand on the throttles, he said yes, the instructor pilot was supposed to do that.

Asked how the airline's training records were maintained, he said on paper, but they were in the process of converting to an electronic records system.

The interview concluded at 1650.

**Interview:** Park Il Jae, VP Safety and Security, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 29, 2013, 1700 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Capt. Park stated the following:

His age was 50 years. He had become a vice president at Asiana on January 4, 2013. He had been the head of safety and security for 6.5 months. Prior to that he had been a line pilot for a year, and before that for about three years, he had served as chief pilot for the A320 and the B737. Prior to that, he spent about 3.5 years as a flight safety officer on the safety management team. He had been hired by Asiana in 1991. Capt. Park had never flown with Lee Kang Kuk or Lee Jung Min.

Asked to describe his duties and responsibilities as the VP of Safety and Security, he said he focused on proactive action. They investigated systematically and found the probable cause of incidents and tried to prevent recurrence. They also monitored the airline's safety status and condition. He reported directly to the airline's CEO. Capt. Park decided safety policy.

Asked who was in charge of the company's investigation team for the Asiana 214 accident, he said he had assigned Dr. Byeon to that role. Asked if there were any other audits or investigations going on, he said that the Ministry of Land, Infrastructure, and Transportation (MOLIT) would be performing an accident-related investigation until August 9, 2013. He stated that the investigation might be extended one more week.

Capt. Park was asked to describe the company's history with safety management systems (SMSs). He said that in 2005, the company had sent personnel to the Southern California Safety Institute in Los Angeles, California, where they had received certification. They had begun setting up the company's SMS around 2006. They began with the ICAO document 9058. Safety team members met once or twice a week to share information. In 2008, MOLIT approved the company's SMS manual, and Asiana became the first airline in Korea to have an SMS. They were very proud of that.

Beginning on January 4, 2008, Asiana had changed its corporate structure so that the director of safety and security reported directly to the CEO. Before that, the safety department had been located within the flight operations division. At present, they could directly report information to CEO without any distortion. Their SMS was structured according to ICAO guidance. It included components addressing hazard identification, risk management, feedback, and monitoring.

Asked whether they had progressed through different levels of SMS implementation, he said that since he had become the director of safety and security in February 2013, they had been working to upgrade the SMS program to a web-based “Smart SMS” system. Under that system, safety reporting and FOQA data could be married up and analyzed. Asked whether Asiana was at the highest level of SMS implementation, he said they were proud of their system but trying to improve it more in the future.

Capt. Park was asked about the staffing in his department and he said they had 25 people. There was a general manager just below him. In addition, they had six flight safety officers, six ground safety officers, and five or six people in the FOQA group.

Asked if he felt he had received adequate resources to run the airline’s SMS program he said yes. He said the most important thing was the company’s serious commitment. Second was ensuring an appropriate structure, and third was ensuring that adequate resources, including personnel with adequate safety training and education, were available. He said all of the personnel in the safety department had appropriate certifications. Ten different items were required for a functioning SMS, including investigation, hazard identification, and a lot of things. As a vice president, he tried to provide an environment that would allow them to develop the system. Asked whether the safety management manual had been developed in-house, he said yes. Asked if that was where the company’s safety policy was located, he said yes.

Capt. Park was asked if he felt like he had adequate support from the CEO, and he said yes. Asked to describe his pattern of communication with the CEO, he said every Monday morning at 7:30 AM he met with the CEO and seven senior VPs and reported safety issues. It was very stressful.

Asked how Asiana performed hazard identification and risk assessment, he said they had five hazard identification tools. The first was safety reporting, which included captain reports, cabin reports, and occurrence reports. Safety reports could be submitted penalty-free, in which case they were de-identified and made confidential. Dr. Byeon had started the airline’s hazard reporting program in 1994. The second hazard identification tool at the airline was the FOQA program. The third program was the audit or internal evaluation program. The fourth was an employee survey. The fifth was an inspections program. The safety reporting systems were all web-based so personnel could fill them out no matter where they were located.

Asked if there was a risk assessment stage, he said that if they recognized a hazard, they would report it to the general manager and discuss it and assess the hazard. They prioritized the hazards and applied risk management. There were many risk management strategies that could be employed. Elimination was the best but could also be the most expensive. The next best was mitigation. The third was to do nothing but assess a hazard as being under control. They had to balance cost with effectiveness.

Capt. Park was asked about the airline’s safety assurance activities. He said that the airline had safety performance indicators and safety performance targets. They collected data, analyzed the data, published the results, and gave a report to his boss. It was not possible to achieve zero defects, so they tried to achieve targets that represented acceptable levels. If they found that they

were over the targets, they coordinated action within his division. Asked for examples of the airline's safety performance targets, he said that, beginning January 4, 2008, the airline had eight safety performance targets. In 2013 or 2014 they were planning to divide them into more detailed sub-categories because Capt. Park did not think eight targets was sufficient. He said examples of safety targets included the number of EGPWS warnings for sink rate.

Capt. Park was asked about the airline's safety promotion activities. He said they disseminated safety information to flight crews through the airline's intranet network called CreWorld. The pilots and cabin crew could check their schedules and check the safety board where general information was collected. They disseminated flight information through that and through safety directives. They also disseminated general, nice-to-know information. In addition, when pilots submitted reports voluntarily, they sent them feedback on what was being done to solve the problem. When a pilot submitted a captain report, there was an item asking if they wanted a reply, and they could check yes or no. If the submitter checked yes, they would send a reply to the pilot.

Asked to describe the level of participation in the safety reporting system, he said the reporting culture was very good for captain reports and cabin reports. They received many reports. They were working to build up the ground safety reporting culture. Asked what report an FO would use if they wanted to report a safety issue, Capt. Park said they could submit a captain report or an operation report. An operation report was a small report that went to the flight operations team. There was nothing preventing a first officer from submitting a captain report.

Asked to describe the airline's efforts to promote a just culture, Capt. Park said that he was very concerned with safety. The foundation of safety rested with a good aircraft, a well-trained pilot, and compliance with regulations. They strove to have a reporting culture, an information culture, a learning culture, and a just culture. Asked what efforts Asiana made to ensure that people could report issues without fear of retribution, he said reports could be de-identified and they had a no-retribution policy. There was no penalty for reporting. Another strategy was acknowledgement. Reports were acknowledged and reporters were given feedback.

Asked how often the airline conducted LOSA audits, he said it was not his team's job to perform the LOSA audits. They were coordinated by quality assurance. However, Asiana did conduct LOSA audits and they were the only airline in Korea to do so. All Nippon Airways (ANA) and others had come to see Asiana's program, so they were very proud. Capt. Park said that he was a LOSA observer when the program started in 2004. His role was to serve as a fly on the wall and attempt to document natural pilot performance. Asked whether the company's LOSA program followed the standards developed at the University of Texas at Austin, he said yes. Asiana sent data to them and initiated corrective safety action as a result of the audits. If interested, investigators could ask Dr. Choi, the LOSA manager, about that.

Asked to describe the company's efforts to promote a learning culture, he said that they had well-trained pilots. They had a lot of students in the training center. Also, a learning culture meant they tried to be professionals, share information together, and study hard.



Capt. Park was asked whether Asiana tried to use information about hazards that had been identified in their training program. He said that they did provide information to the training team and try to give the pilots a chance to practice managing hazards that had been identified.

Capt. Park was asked if Asiana had changed its policy about who could initiate a go around as a result of a 2005 tailstrike event, such that a first officer was no longer allowed to make a go around. He said that the go around decision should be made by the PIC. If the FO was the PF, he could initiate a go around, but control was then transferred to the PIC using positive transfer of controls.

Asked whether just culture was a concept that was more difficult to implement in Korean culture, he said it was pretty well understood. They had a phrase for it in Korean, “kong jung moon wha” (just culture).

Asked whether he thought there was a high authority gradient in Asiana cockpits, Capt. Park said in the case of the accident flightcrew, he personally knew the PF and the PM (the instructor) quite well and they were both good guys. He thought some Asiana captains might have higher power distance, but those two were not like that. They were very, very friendly. In addition, he thought there was not so much power distance in the airline. As evidence of this, he pointed out that the first officer who was on the jump seat during the accident flight called out sink rate twice. He thought the accident PIC had recognized the first officer’s input and initiated a go-around. That was the culture at the airline.

Asked what percentage of the pilot group had a military background, he said about 60 percent of the company’s 1,300 pilots. He said there were many courses on CRM. The courses addressed power distance. Very high power distance could lead to conflict, but very low power distance could also lead to problems. If the FO talked strongly to the captain, for example, there was no discipline. CRM taught the pilots to focus on what was right rather than who was right.

Asked whether Asiana had gotten the benefit of sharing best practices with their code share partner, he said yes. They had a biannual IOSA audit and Asiana’s flight safety officers went to the Association of Asia Pacific Airlines meetings annually. In addition, the star alliance was a pilot association. It was for safety. Every time they joined, they shared flight safety information and new information, and received feedback.

Asked whether the number of safety reports received by the company went up every year, he said that the flight operations team dealt with that. The safety department had the data. Asked what percentage of captain reports were made by captains, he said most. Asked if there were specific kinds of events that required a report to be filed, he said yes, there were 31 items specified in the FOM. Asked if crews were required to submit a report for a go around, he said they did not receive reports for go arounds. The company encouraged go arounds. When Capt. Park had worked as the A320 chief pilot, he had promised his pilots that if they performed a go around there would be no penalty and they did not have to report it to him.

Asked whether the safety information provided to pilots varied by fleet, he said yes.

Capt. Park was asked whether the company had FOQA data on any situations similar to the accident, he said the accident was under investigation and the company did not want to jump to premature conclusions. In addition, FOQA data were confidential and de-identified and he had no comment about that. Capt. Park was asked whether the airplane remaining in thrust hold mode if power was not increased could be seen as a threat or danger, he said he had no comment because the investigation was in progress and there had not been any conclusions yet.

Capt. Park was asked if there was any safety protection program to reduce power distance among crews. He said the flight safety team was trying to bring up the culture between the FOs and captains to eliminate power distance issues.

Asked whether he had any data on that, he said the Asiana flight training team tried to create many CRM programs and they believed CRM was not only in the cockpit. Asiana conducted joint crew resource management (JCRM) training, and had 6<sup>th</sup> generation TEM.

The interview concluded at 1809.

**Interview:** Kim Young Chae, First Officer, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 30, 2013, 0830 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Mr. Kim stated the following:

He was 36 years of age. He was in transition training from the A320 to the B747. He had been in B747 training for two months. Before that, he had been flying the A320 for three years. He was hired by Asiana in 2009. Asked where he had come from before he worked at Asiana, he said he had worked for a non-aviation American company called Arrowhead Industries for three years. His total flying time was 2,600 hours. When he joined Asiana he had 250 hours. He had received his initial flight training at Oregon State University in the U.S. Asked how the company had selected him as a pilot, he said he had finished his military service in 2003, joined an American company, went to the U.S. to get his pilot's license, and then applied for the job opening at Asiana. He was self-sponsored.

He had flown with Lee Kang Kuk. His last flight with him had been in March 2013. He thought he had had two flights with him, but he only remembered the last one. It was a flight to Palau, a one-day roundtrip with a quick turn. The weather conditions were pretty good during the Palau flight. The approach into Palau was an RNAV approach. Another crew flew the leg back to Incheon. There were two sets of flight crewmembers. The company had scheduled it that way.

Asked whether the airline could have operated the flight to Palau and back with one flightcrew, he said the roundtrip flight time was almost 8 hours, and 8 hours was the limit for flight time. It might have been possible to fly there and back with one crew, but the company had decided to use two crews. Asked whether either of the flights were training flights, he said no.

There were no unusual events during the RNAV approach and landing at Palau. The FO set up the approach in the FMC and it provided a glide path. Asked whether the glidepath was presented during the approach, he said yes. He saw a 3-degree glide path on the FMC. Asked to describe the glide path symbol on the PFD, he said it was just a dot. Asked for specifics about the weather at Palau, he said that the visibility was very good. Asked whether the captain had maintained the glide path during the approach, he said the visibility was very good. Asked whether the captain had maintained the glide path throughout the approach, he said yes.

Asked whether he recalled whether Lee Kang Kuk had used FLCH during the descent, he said FLCH was used from the beginning of the descent. Usually during flights to Saipan or Palau when they descended they used "open descent" which is similar to FLCH, because the Airbus did not have FLCH mode. Open descent provided a steep descent rate. Asked whether they used

VNAV when they got down low on the approach, he said they used “managed” which was equivalent to LNAV/VNAV. He stated that the pilots and the company wanted to use managed mode for safety.

Asked what percentage of landings he had performed in his three years as an A320 FO, he said it depended on the captain, but normally he got 50% of the legs. Asked to clarify how it depended on the captain, he said if the captain had less experience, company policy said the captain could not give a landing to the FO.

Asked if the more experienced captains sometimes took more than half the landings, he said no. They liked to give the FOs a chance to fly. Asked what percentage of the time he flew visual approaches, he said captains almost always gave him an ILS approach. Usually the captain did the nonprecision approaches.

Asked how often he flew a visual approach as PF, he said he had not had a chance to fly a visual approach yet. Asked what percentage of the time the captain flew a visual approach during his three years on the Airbus, he said he had seen a captain fly a visual approach with the AP off less than five times in three years.

Asked what cues he looked for to stay on glide path and speed when he had to fly a visual approach with no glideslope, he said he had received training in the simulator on circling and visual approaches. As PF he just followed Asiana SOPs. On final approach, they tried to make two red and two white PAPI lights, follow the glide path, and remain on it. Asked whether he had ever practiced a visual approach with no PAPI, he said he had done it one time during initial training on the A320. It was a night approach and they had only the runway lights for visual reference.

Asked what Asiana had taught him to do if he noticed that an approach had become unstable, he said he would recommend a go-around. Asked what he would say, he said he would call out, “I think it’s a good idea to go around.” Asked whether he would only recommend a go-around as PM if it was a very bad situation, such that the crew received a terrain warning and he was thinking they might crash, he said no. He would say loudly “Go around!” Asked if he would take control of the airplane in that situation, he said he would take control if the captain did not go around.

Asked what his callout would be, if he was PM on an A320 during an approach and the airplane was not stable at 500 feet in visual conditions, he said that as PM he would call out “500,” and if the captain decided the flight was safe enough the captain would say “continue.” If the captain thought it was dangerous he would say “go around.” Asked to clarify what he would say if the situation was unstable, he would say “500 sir, I think it’s a good idea to go around.” Asked what he would do in that same situation if he was the PF and the PM said “500,” he said he would call out “go around,” push the TOGA button, and initiate a go-around.

Mr. Kim was asked if he could recall Lee Kang Kuk well, and he said yes, Captain Lee was a very nice captain. Captain Lee enjoyed flying. Asked whether Captain Lee was open to input or

had a dominant personality, Mr. Kim said he had been pretty open to input and accepted first officers' ideas.

Asked to describe Lee Kang Kuk's flying proficiency, he said his flying was to the standard. Asked to describe Captain Lee's cockpit management, he said Captain Lee had tried to make the cockpit very comfortable. He was very gentle. Most FOs liked him. Asked whether he recalled anything unusual from their flight together, he said he did not.

Asked whether the company addressed assertiveness during CRM training, he said he had taken assertiveness training three times. Most of the time, he got a non-normal situation and shared an idea about how they should handle it. They did share such ideas. He had also completed one CRM training class that included cabin crew. They had talked about the same kinds of things.

Asked whether the airline trained him in a procedure for taking control if the PF did not respond when he identified a dangerous condition, he said yes. The procedure said that if the captain did not answer, the FO should take control. Mr. Kim said that if he made one callout and the captain did not answer, he would see if the captain was alive or okay. Depending on how the captain looked he might take control. If the captain looked okay, he would call out again, and if the captain did not respond he would take control of the airplane.

Mr. Kim was asked how low he could be and still use open descent mode on the Airbus. He said they had to be above 5,000 feet.

Asked whether he had received instruction on fatigue during CRM training he said yes. The training had addressed fatigue as a physical condition, its influence on the body, and how to handle and avoid fatigue. Asked what advice he had received for dealing with fatigue on long flights, he said he had been told to stand up and stretch. Before the flight he was supposed to try and get enough rest. The A320 was used for short flights, so they did not generally have relief crews and scheduled breaks during the flight.

Asked whether he would feel a little nervous if he had to perform a visual approach without a glide path or glideslope, he said "Just a little, not too much." Asked if he would feel the same about having to perform a visual approach in the B747, he said he had flown less than 30 hours in the B747 flight simulator, so he did not yet feel comfortable. He had not yet begun his operating experience (OE).

Mr. Kim was asked how easy it was to apply the standard descent profile for visual approaches that was taught in the manuals when he was faced with actual real life constraints. He said he had done several in the airplane and it was almost the same as it was in training. He did not find any big difference between training and the actual flights. Asked whether the captain was flying during those approaches, he said yes.

Asked who selected changes on the MCP, when he flew the A320, he said the PF did. Asked whether callouts were required for MCP changes, he said yes. Asked whether Lee Kang Kuk was good at making callouts when selecting changes on the MCP, Mr. Kim said yes.

Mr. Kim was asked if he had received any special training at Asiana highlighting the differences between Airbus and Boeing airplanes. He said no specific training. Asked whether, during a circling visual approach with the AP on in the circle, they used the AP until making their base turn, he said they used the AP as long as possible.

Asked whether there were any captains with whom the FOs did not want to fly, he said it was a matter of personal opinion and depended on individual personalities. There were one or two captains that he did not like to fly with. Asked if he coordinated those preferences with the scheduling department he said no.

In his training on the B747 he did not fly the whole approach with the AT on.

Mr. Kim was asked if he recalled receiving a preflight briefing from Lee Kang Kuk when he met him before their flight together. He said yes. It was company procedure to meet 1 hour 20 minutes before the flight and check the weather, the NOTAMs, and the airplane. It was standard procedure to meet the captain before the flight. Asked what was briefed, he said they just checked the weather and flight plan in the briefing room, and then they briefed in the airplane.

The identifier for Palau's airport was "ROR." They tended to fly an RNAV approach to runway 9. The runway was 9,000 feet long and they tended to fly the approach straight in.

Asked what his responsibility was to monitor inside and outside the airplane and make callouts he said they used the FMC for the straight-in visual approach. There was a small ball in the PFD that provided an artificial glide path. It helped them maintain a constant descent rate.

The Palau airport was terrible. It was more difficult than SFO. There was no centerline. There was no touchdown zone lighting, and there was no PAPI or VASI, just runway lights. It was a very difficult airport. When they followed the FMC-programmed approach he saw the ball as PM and he advised the PF when they were on the glideslope and alerted the PF if they were high or low.

The airport did not have visual cues on the approach, just the senses of the pilot. He just followed the procedure and programmed the route and they made a safe landing. Asked whether Lee Kang Kuk had briefed the go around procedure during his approach briefing, Mr. Kim said yes. Asked whether Mr. Lee had indicated what he would do with the airplane's configuration, like selecting flaps 20, Mr. Kim said yes.

Mr. Kim was asked if he had ever seen a pilot disconnect the AT in flight, he said one time an instructor had done so. The instructor was teaching during an initial flight.

Asked whether CRM was evaluated during recurrent training, he said yes. Asked whether he received an individual rating for that, he said yes. It was a three-point scale: good, fair, or poor.

Asked whether it was common to debrief with the captains after a flight, he said sometimes. For example, if he did a landing that was not perfect, the captain might provide advice on landings.

Asked whether Lee Kang Kuk had disconnected the AP during their flight, he said he could not remember.

Mr. Kim said he had been involved in at least 10 go-arounds on A320. They were mostly due to windshear warnings from the EGPWS, at Cheju and Incheon. Asked whether the captains' go around procedure had been correct, he said yes. Asked whether every one of the go-arounds had started on the captain's initiative, he said yes. Asked whether captains put their hand on the throttle during approach when he was the PF, he said sometimes. Asked whether he had suggested the go-arounds during any of those 10 go-arounds he had witnessed, he said most of the time the go around was prompted by an EGPWS warning and company policy was for the captain to take over the controls in that circumstance. There was no hesitation. One or two of the go-arounds were due to an unstable condition because Cheju sometimes had a tailwind in both directions and it could be difficult to safely descend. Even though the captain was following the exact procedure, he saw four whites on the PAPI and could not make a high enough descent rate because the airplane was already descending at 1,000 fpm. There was no reason why we they should not make a go around, so captain had gone around. Asked if he had ever been involved in a go around where he was the first person to suggest or take action, he said no, the situation had always been very clear.

Mr. Kim was asked what he was supposed to do if he noticed that the speed had become low on final. He said he was supposed to call out "speed." Asked what the captain was supposed to do in response, he said the captain was supposed to use the AT until touchdown, so he had never seen the speed get low.

Asked whether he had received any special instruction on monitoring skills during CRM training, he said no. Asked what the captain was supposed to do if he called out "speed" or "speed low" he said he did not have any experience with low speed, so he had never thought about that, but if he was PF he would add more power – on the Boeing, not the Airbus. Asked to clarify whether the SOPs specified a required verbal response, he said yes, "check."

Mr. Kim was asked how he felt about Asiana's attention to safety and the quality of its safety programs. He said he thought it was pretty good and that they followed Korean aviation law. It was not bad. Asked how he would communicate a safety issue to the company if he noticed one, he said that all the crews could make a report using the internet. Everybody could see the notice. Asked what reporting system he would use, he said CreWorld. Asked what type of report he would use on CreWorld, he said a captain or a first officer could make a flight report.

Asked whether he had submitted a report describing an operational safety issue before, he said yes, one time. Asked what type of issue he had reported, he said one time when they were landing on Cheju Island the weather was terrible. They had a very strong crosswind. The captain made the landing and it was a little rough. One of the cabin crewmembers asked if it had been a hard landing, and he said no, it was within the limits. She said she felt hurt, however, so he submitted a report. Asked what had happened as a result of his report, he said he had received a phone call from "our team." They had asked him about situation, he had explained it, and they had said okay. Asked whether anyone was punished as a result, he said there was nothing serious, no punishment.

Mr. Kim was asked what the company's response was to a go around. He said they always recommended a go-around if an approach was unsafe or unstable. The company strongly recommended a go around any time safety was not confirmed. Asked whether all 10 of his go-arounds had been free of any repercussion, he said yes.

Mr. Kim was asked what kind of training he had received on the B747 autoflight system. He said he had received ground instruction and CBT. Asked how he found the transition from the Airbus, he said the concept was a little different, but it was not too difficult to understand. Asked whether the Airbus provided minimum speed protection, he said yes. Asked whether the B747 provided minimum speed protection he said yes. Asked whether the autothrust / autothrottle systems would advance the throttles to protect against a stall, he said yes in the Airbus, but not on the B747. If the autothrottle was working on the B747, it would maintain speed, but in manual thrust it would not provide an automatic power up. Asked whether he thought it would be difficult or easy to adjust to this difference and remember that the B747 would not provide that protection, he said it would not be difficult. Asked how he felt about the quality of the 747 autoflight system training he had received he said it had been enough.

Asked whether there was anything he had not been asked that he thought investigators should know in order to further the investigation, he said no.

The interview concluded at 0955.



**Interview:** Han Ka Ram, First Officer, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 30, 2013, 1025 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Mr. Han stated the following.

He was an Asiana Airbus A320 first officer and was 29 years of age. He had been an Asiana first officer for approximately 8 months. He was hired by Asiana December 11, 2011. His total flight time was approximately 800 hours. When he was hired, he had 250 flight hours. Before he was hired by Asiana, he was a student at Hanso College, located in Korea, where he also completed his flight training. He held both a Korean and a US commercial pilot certificate in addition to a type rating on the A320.

Mr. Han had flown once with Capt. Lee Kang Kuk in March, 2013. The trip was a two-segment flight from Incheon (ICN) to Sakhalinsk (UUS) and return to Incheon with a total flight time for both legs of approximately 4 hours. He was the PM on both legs. He said the weather in Sakhalinsk was good but cold. The arrival weather was clear and he believed the approach flown was an ILS but he was not certain. He had no recollections of anything unusual occurring.

The weather on the return to Incheon was also good and an ILS approach was flown. When asked if the CA turned off the AP during the approach to either airport, Mr. Han replied yes but did not recall at what specific altitude for either approach. He said that there was no windshear during the trip.

Mr. Han was asked about his recollection as to what it was like to fly with Capt. Lee. He stated that he was a very comfortable man to fly with. He also stated that he did not recall anything else in particular. He was asked about Capt. Lee as compared to other captains with whom he had flown. Mr. Han stated that Capt. Lee made him feel more comfortable than other captains. When asked for an example, Mr. Han stated that Capt. Lee was a very smiley person and made him feel comfortable. When asked if there was anything that Capt. Lee did that was not as good, Mr. Han replied that he did not remember anything.

Mr. Han was asked if he has done a go around at Asiana. Mr. Han stated just one time. When asked for more specifics, Mr. Han stated that the weather was not good and that he did a go around because of clouds in Ulsan airport (USN) in southern Korea. Mr. Han was the PM on that flight. He stated that the captain on that flight called for the go around. When asked why the captain called for a go around, he responded that it was because the runway was not "in visual". Asked whether he, as the PM, had made a callout at minimums, he stated that he did not really remember the details.

When asked about his training on the A320 autoflight system, he stated that he had received ground and advanced procedure trainer (APT) training. The APT was like a flight training device. When asked how he felt about the quality of the training, Mr. Han stated that the training was good enough to make him understand the autoflight system. When asked about his confidence level of his knowledge of that system, he said that he definitely understood each different mode.

He was asked if Asiana had an automation policy – using as little as possible or as much as possible. He said that they recommended using as much as possible. When asked if there was a company policy that stated when a flight crew should reduce the amount of automation they were using, he stated that the automation should be reduced if there was a problem in the system. He was asked if he had ever been in a situation where he was giving changing ATC clearances and had to turn off the automation because he was having trouble handling the situation with the automation on. He said that he had never had that experience.

He was asked how long you could use an open descent mode on approach in the A320. He stated that you should not use the mode at low altitude, not below 500 feet.

When asked if he recalled receiving training on assertiveness, alerting to hazards, and suggesting a course of action, he said yes. He was asked if he would feel comfortable suggesting a course of action to a captain if he saw a potential hazard. He replied that if it had to be done, he would do so. He was asked if his airline had a procedure for a first officer to take control if the captain was not responding appropriately to a potential hazard. Mr. Han responded that he was to call the captain twice and that if the captain did not respond, the first officer would take control of the airplane. Mr. Han had not had to do that in his flying. When asked if he felt that he would be capable of doing it, he responded affirmatively. He was asked if the company encouraged first officers speak up about potential hazards in flight. He stated that the company encouraged the first officer to be more assertive in a hazardous situation.

He was asked if either pilot could decide that a go around was necessary. He said yes. When asked if he had ever suggested to a captain that they go around and then a go around was not executed, he stated no. He was asked if he had received any special emphasis on monitoring and staying engaged with monitoring as the PM. He stated that was included in the overall training.

Mr. Han was asked if he felt that Asiana management was committed to improving safety. He said yes. He was asked how he would communicate safety concerns to management. He replied that a reporting system was available but that he had not used it.

He was asked if the airline had a stable approach policy with mandatory go arounds. He said yes. Asked by what altitude a crew had to be stable during a visual approach, he said “500 feet.” Asked what he did as PM at 500 feet, he said he looked at the PFD and engine monitoring and looked at what was going on. He was asked if there was an acceptable range of airspeed, and he said yes, it was +10 or -5 knots. Asked what his callout should be if everything was in the acceptable range, he said he would just call out if something was not normal or was out of range. Asked whether he had a callout at 500 feet, he said “500 feet.” Asked what the PF was supposed

to say, he replied, “stabilized”. Mr. Han said he had not done any go arounds for an unstable approach.

Asked if he had any turbine flight time when he was hired at Asiana, he said no and that his first turbine training was in the Airbus. He was asked if he had ever flown the Airbus with the autothrottles off, he said yes, but only in the simulator as part of the simulator course. Asked whether any of the captains he had flown with ever turned off the autothrottles, he stated no.

Regarding the two flight segments that Mr. Han flew with Capt. Lee, he was asked why he was the PM on both legs. He stated that this was his first experience flying to Sakhalinsk (UUS, Yuzhno-Sakhalinsk airport, Russia) so Capt. Lee flew. Since Mr. Han had not departed from Sakhalinsk before, Capt. Lee also flew the return segment to Incheon.

He was asked if he knew of any first officers that had submitted safety reports. He said that he had heard of some but could not recall the details when asked.

He was asked if he had recurrent training at Asiana yet. He stated yes. He was asked if CRM was evaluated in his training. He said yes. He was asked if the CRM was evaluated individually for the captain and first officer, or if they were evaluated as a crew. Mr. Han said they were given individual scores.

Mr. Han was asked about the go around that he witnessed. He stated that it was a go around from a VOR non-precision approach. He did not remember at what altitude the go around was initiated. He said that the PF used SELECTED with an altitude for the descent for the vertical mode.

Mr. Han was asked if there was anything else that he felt the investigators should know or that he expected the investigators to ask. He said no.

The interview concluded at 1115 KST.

**Interview:** Kim Jae Jung, OE Instructor Pilot, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 31, 2013, 0800 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Capt. Kim stated the following:

He was a B777 captain for Asiana and was 57 years old. He had been an instructor but his instructor qualification expired a month ago. Instructor qualification lasts 3 years, and can be renewed one time for another 3 years, and he just completed 6 years. He was a captain's instructor and a check airman. He performed simulator training, which was done in two parts. The first part was in fixed base simulator (FBS), which was the part he performed. The second part was full flight simulator (FFS), which was conducted by contractors. He also performed Operating Experience (OE) flights as instructor. His total flight time was 16,300 hours and his approximate B777 flight time was 6,000 hours.

Asked if he had flown with Capt. Lee Jung Min, Capt. Kim stated he had done no training with him and only conducted his final OE flight check. The check was conducted at the end of Lee Jung Min's training, and Capt. Kim checked whether his training was completed and his capability was good. Asked if he had ever performed a check on Capt. Lee before or if he had ever flown a trip with Capt. Lee before, he said he did not remember. The OE check he conducted with Capt. Lee was on June 12, 2013, and it was a one day trip from Incheon to Fukuoka, Japan and back. There were two flights.

Capt. Kim's impression of Capt. Lee's style of flying was that he was very calm, followed the procedures correctly, had professional knowledge of the flight, and had good capability and skill as an instructor.

Asked to describe something Capt. Lee did well on the check ride, Capt. Kim stated he was sitting on the left and Jung Min was sitting on the right so Capt. Kim could observe Jung Min's capability as an instructor. Capt. Lee's takeoff, flying, and landing were done well, and Capt. Lee did pretty well overall. Capt. Lee did all the checklist items. It was two months ago, so he could not remember anything more detailed. Asked to describe something he did less well, he said he did pretty well overall. His approach was slightly to the right, just a little bit, but within the permissible standard, so Capt. Kim just pointed that out to him.

Asked who was the PIC on an OE flight, Capt. Kim stated he was PIC and Capt. Lee was PF. Asked who could call for go around at Asiana, he said that the procedure states that the PF calls first for the go around. Asked whether on an OE flight the instructor could call for the go around first, he said that the instructor can call it out first, but the PF can call for a go around too. If the

PF did not call for it, the instructor could call for a go around, too. Asked whether at Asiana an FO who was serving as PM could call for go around first, he said yes, if conditions made it necessary. The first decision was supposed to be made by the PF, but if not done, the PM could call for a go around. During OE, the instructor must have two roles, instructor and pilot monitoring. Asked whether he discussed those two roles with Capt. Lee, he said he did not remember.

Asked how often Asiana pilots flew visual instead of instrument approaches in real flight, Capt. Kim stated if there was an ILS (instrument landing system) they would avoid flying the visual approach. However, there were many airports where there was no ILS and they had to do a circling or visual approach. They do practice visual approaches in the simulator at Asiana. Asked whether they practiced visual approaches in simulator without PAPI, glideslope or localizer, he stated there was a scenario in the simulator for this, he had experienced it and he had done it with students.

Over his six years as an OE instructor and examiner he had conducted many such flights, but he could not remember how many. Asked if he had ever not passed a pilot on an OE check, he said yes but he could not remember when. He conducted OE training for FOs, captains and instructors, and there were only 23 instructors now. Asked if he could remember the last time he failed someone on OE, he stated it was not this year, it could have been a couple of years ago but he did not remember.

He had never had an opportunity to see Capt. Lee interact with another captain who was in training. Capt. Kim had trained both captains and FOs. He conducted OE checks for line pilots as well as for instructor pilots. Capt. Kim felt that Capt. Lee's interpersonal characteristics were that he was very calm and followed all the procedures very well. Capt. Lee flew both legs during the check flights. Capt. Kim's evaluation of Capt. Lee as an instructor was that he did a really good job.

Capt. Kim was asked what kinds of things he looked for in a good instructor. He looked to see if Capt. Lee followed all the procedures correctly and whether he followed all instructions well. On the ground or in flight, he looked to see if Capt. Lee was monitoring all the instruments and if he did the standard callouts well or missed any. He did the callouts well. Capt. Kim evaluated Capt. Lee's understanding and knowledge of CRM. With radio ATC communication, Capt. Kim observed Capt. Lee's monitoring capability and communication.

He was asked what he would expect from Capt. Lee when monitoring below 1,000 feet. Below 1,000 feet in visual meteorological conditions (VMC), he expected that the instructor pilot (IP) was monitoring altitude, speed, and landing configuration, and that he was ready for the landing. On a visual approach with a PAPI available but no glide slope, he expected the IP to divide his attention 50% outside and 50% inside the cockpit. He should be watching the instruments – speed, altitude, numbers and he should have the runway centered and follow the PAPI.

He was asked what would Capt. Lee be monitoring at 500 feet and should he make any callouts. There were many items to examine and call out. First check the runway. The altitude deviation could be + 100 feet but – 0 feet (no deviation low), the airspeed allowable deviation was + 10 kts

and -5 kts, the PAPI had to be checked for 2 red and 2 white lights, the landing configuration had to be checked, ATC clearance to land verified and abnormal conditions checked.

Asked if there was any required check of engines spooled up and not at zero, Capt. Kim stated it was most important to check speed and if the AT was on. The hand of the PF was supposed to be on the throttles and the AT mode should be speed mode.

He was asked who was supposed to select the vertical mode on the mode control panel (MCP) when descending through 2,000 feet, and he said that the PF was supposed to be the one who selected the vertical mode on the MCP. In manual flight (autopilot off), the PM should select the mode. It was ordered by the PF. With AP engaged, the PF should call out when he was making the MCP selection.

He was asked what would happen if the AP was on, the altitude was 2,000 feet, the vertical mode was vertical speed (VS), the MCP altitude was set to 3,000 feet, and the vertical mode was changed to FLCH. He stated the airplane would try to go to the selected altitude and if the airplane was in speed mode the throttles would increase. Asked what mode the AT would go to if the throttles were manually retarded, he stated the speed would decrease but the mode would not change. When asked what happens if you let go of the throttles in this situation, he stated the power would be increased because it's in speed mode. He thought this scenario was not in the manual and he did not expect this question.

After a break, Capt. Kim stated that he wanted to make it clear that he had never experienced this unrealistic scenario and he was very surprised to be questioned about this type of scenario and was a little bit nervous and he could not really answer for that because he did not know.

He was familiar with the minimum speed protection features of the B777. He was asked in what circumstances the feature would automatically advance the throttles to prevent you from going below the minimum speed. He stated the low speed protection functions if the AP was disconnected and both FDs were off. When the speed decreased, "low speed" appeared in the engine indication and crew alerting system (EICAS), the stick shaker activated, the autothrottle engaged, the throttles advanced and the speed increased. Asked if that would happen if one was in thrust hold mode, he stated if thrust mode was in hold, it would not happen.

He was very confident in his ability to fly a visual approach in the B777 without glideslope or glide path and only PAPI. He thought every pilot could perform that landing without any problems. He did not remember noticing nervousness among pilots with less experience on the B777 in this situation.

The airline did have a procedure for the PM to point out a hazard and take control if necessary. The procedure was in the CRM manual. The policy was if there was no response to two challenges the PM could take control of the airplane. He had never seen reluctance on the part of student captains or FOs to call for a go around first, if necessary. He had landed at SFO many times and did not think it was any more difficult than any other airport, but he thought each airport had its own characteristics and unique situations. He partially agreed with the statements from some pilots that SFO was more difficult because of speed, altitude restrictions and ATC

communications. As they descended from higher altitude, a tailwind or a short pattern could make it harder to land unless the crew was prepared. It was possible to ask for a wide pattern. The degree of difficulty of the approach and landing depended on the particular situation.

It was his belief that Asiana's safety attitude and safety culture was very good. If he had a safety concern he would report it using a captain report. He had made such a report but could not recall when, and he could not recall any example of what he had reported.

He had attended meetings with other instructors in his 6 years as instructor in which they discussed student performance. Topics included each individual student's character, his mistakes, certain problems, how the instructor could teach them and what kind of curriculum was needed to improve their capability. He felt Asiana supported the decisions of instructors and check pilots. When asked if instructors and check pilots received recalibration training during the year, he said yes.

Asiana policy was that at 500 feet landing clearance had to be checked. He would go around if he saw a PAPI with 3 red and 1 white lights with no glide slope unless he had time to make a correction. He did not recall how many flights were needed to complete OE in the B777. If an OE check flight was unsatisfactory, he would report this to the company and the trainee would be taken off the schedule. A committee would decide whether to extend the training, have the trainee go back for further training, or have the trainee go back to a previous airplane. Trainees did not have the same instructor on different OE flights. Asked whether he flew with manual throttle often himself, he said that in normal flight, it was normal procedure to use AT and he did.

Asked what was the most difficult airport, he stated that was a hard question and the answer depended on the situation. He would say that SFO was not an easy airport to land at, but it was hard to pick only one. There was supposed to be one instructor in charge of each student for a particular curriculum, but Capt. Kim could not remember who that instructor was for Capt. Lee. He did not know which instructor was in charge of the training for Captain Lee, but it was possible there might have been two such instructors.

A captain in training who got four red PAPI lights when flying an approach below 500 feet would fail an OE check flight. During training it would not be a failure because you cannot fail training, but the instructor would discuss whether to stop or to continue training. The instructor might discuss this with other instructors as well.

The interview concluded at 1038.

**Interview:** Kang Seun Ku, OE instructor pilot  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 31, 2013, 1100 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Capt. Kang stated the following:

He was a senior pilot and instructor and was 56 years old. He had been an instructor a little more than two years and he had flown the B777 a little more than 8 years. He was hired at Asiana in November 1996. His total flight time was more than 10,000 hours but he could not recall how much flight time he had on the B777. He was both a line pilot and an instructor.

He had not ever flown with Capt. Lee Kang Kuk.

He had flown with Capt. Lee Jung Min in June, 2013 during that pilot's instructor OE training, but he had not flown with him any other time. Asked whether he knew him personally, he said he did not know him very well, but they were acquainted in the military and at Asiana. During the OE training he flew two flight legs with him, from ICN (Incheon) to Kansai airport (KIX) in Japan and KIX back to ICN. Instructor OE was only one flight and he believed Capt. Lee Jung Min completed that training with him and Capt. Lee's next flight was his check. He did not remember anything in particular about Capt. Lee's style of flying and he did not remember anything good or bad; he was okay. Capt. Lee Jung Min was the PF on both legs they flew.

Capt. Kang was asked how he could evaluate Capt. Lee as an instructor if Capt. Lee flew both legs. Capt. Kang observed that Capt. Lee had a good character and personality, and it was his observation that he could be a very good instructor.

The approach into Kansai was an ILS and there was a tailwind. There was a company policy to use reverse idle only to save fuel and Capt. Lee did that. Capt. Kang debriefed Capt. Lee that they should use full thrust reverse and full brake because of the tailwind. The approach to ICN was also an ILS, but he did not recall anything special about that landing.

He was asked if during OE flights Capt. Kang discussed with Capt. Lee potential dangers that may happen when the other pilot is your student and you are the instructor. He talked about common errors that students make during flight and during the debriefing with Capt. Lee. A common error for pilots making the transition from smaller to larger airplanes was a tendency to make a late flare because of the increased height of the larger airplane. Forgetting to change radio frequencies was another common error.



He had done many OE flights with new captains and FO's but only two OE flights with new instructors. He was an instructor for a little more than two years and when he had a heavy training schedule he did three or four OE's per month. He had never failed anyone on an OE flight because it was training and it was not pass/fail. He had never disapproved of anyone to finish OE training. He had not conducted any check rides. He did write comments in the training record.

Asked if he was supposed to observe a pilot fly a visual approach during OE, he stated if the visual approach had to be done he observed it, but if it was an ILS approach, he didn't have a chance to observe a visual approach. He had never done a go around during OE training. Asked the best way to descend if the flight is high on final approach, he stated to use the speedbrake. It was okay to use the speedbrake when the flaps were extended. He said if you can descend safely, descend, if not call go around.

He had landed on runway 28L at SFO. Asked if he had ever found himself high during the approach there, he said yes. He recalled a time 2-3 years ago when he had to lower the gear and use the speed brake and he still had to go around. He made the decision to go around on final at 2000 to 3000 feet and between DUYET and HEMAN fixes (he referred to an approach chart to clarify where he was). He was high because ATC gave him radar vectors and the clearance was kind of late and the speed restriction was high. Even though he prepared earlier for gear down, he determined it was not safe, and he should go around.

He was asked what advice he would give to pilots about what they should do at SFO when they are high in order to avoid a go around. He recommended that pilots communicate with ATC the need to give proper altitude and speed for a smooth and easy approach. Asked if one could say "unable" to ATC if they issued a clearance he could not comply with, he said yes. Asked if he had ever done it, he said yes, but not in SFO.

He was asked to describe the difficulty of making an approach to SFO compared to other international destinations. He did not think it was any more difficult than other airports, but in general SFO ATC gave higher altitude and faster speed compared to other international airports. He was confident he could approach and land at SFO with no glide slope or glide path if there was a PAPI. He was asked if he noticed pilots in OE training being nervous about making a visual approach. He stated many times they do ILS approaches and they don't have many opportunities to do visual approaches. He could not remember because there weren't many cases of making visual approaches.

He was asked if he was familiar with the B777 low airspeed aural caution. He stated in normal flight, he did not have a chance to hear it, so he didn't think he was familiar with it. He thought he had heard it in simulator but was not sure. He did not know what it sounded like. There would be an EICAS message "airspeed low."

He was familiar with the low speed protection systems on the B777. Asked if he could describe a situation when low speed protection might activate, he stated if the FMA AT mode was blank, then low speed protection would activate. The speed would automatically increase, but if it did not he would manually increase the thrust. Asked if he would see the throttles move forward by

themselves if speed protection activated, he stated he would keep monitoring the engine display N1 and N2, and if it did not go up to where he expected he would push thrust for more power. Speed would be automatically increased to between MCP speed and minimum maneuvering speed. The low speed protection activation point on the airspeed tape was above the yellow band above the red barber pole. When thrust was in the hold mode, speed protection could not activate. He learned this after the accident.

During a visual approach, descending through 2,000 feet with the AP on and the AT armed, the thrust mode should be "speed." If the pilot then set the MCP altitude to 3,000 feet and pressed the FLCH button, the airplane would try to climb up to 3,000 feet and power would increase. If the AP was then turned off and throttles were retarded manually all the way, he could not say what the thrust mode would be on the FMA.

He did not remember if he ever instructed an RNAV approach, but Asiana did have RNAV approaches. Asked if he had flown an RNAV approach in the simulator in his own training he said he remembered that he did. Asked whether he thought it was difficult, he said he did not think so.

When conducting an OE, the instructor was the PIC. Asked whether he had hands on the throttles during approach at 1,000 feet, he said he had a soft touch, not with a lot of force, but on top of the trainee's hand.

If he was really not satisfied with a trainee he would report to the team or appropriate people to discuss the case, but that had never happened. He did not have any experience doing a flight with AT disconnected. He had submitted captain reports, but never a safety-related report. The point at which landing clearance should be received varied. At London he sometimes received landing clearance as low as 300 feet.

He did not know how to intentionally change the AT mode to hold when descending. In order to get out of hold mode he would probably be able to do so by turning on VNAV or VS. He could also change to altitude hold. When the FD's were both off, the mode would be changed to speed mode.

He did not think that a late landing clearance would have a big influence on his workload at 500 feet. If he had to ask the tower for clearance at 500 feet, that would cause the workload to be a little heavier. Asiana management's commitment to safety was pretty good. He was asked if he felt supported when he made decisions that were in the best interest of safety even it might be expensive. He said that he was just a captain and did not know the policy. When he made a decision like a diversion or go around needed for safety he felt supported by the company.

When asked if there was anything else that he had not been asked about that could help investigators understand the accident, he said no.

The interview concluded at 1240.

**Interview:** Oh Cheol Woo, OE Instructor, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 31, 2013, 1340 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Capt. Oh stated the following information.

Capt. Oh was 50 years of age. He worked for Asiana as a Boeing B777 captain and also as a ground, simulator and flight instructor. He had been a B777 captain since 2003 and was a B767 captain prior to that. He had been a flight instructor for 3-4 years. He was hired by Asiana in 1995 and his total flying time was over 14,000 hours. He had over 5,000 hours PIC on the B777. Prior to working for Asiana, he flew numerous airplanes in the Korean Air Force such as A-37, T-41, T-37, and O-2.

Capt. Oh had flown with Capt. Lee Kang Kuk on July 4<sup>th</sup>, two days before the SFO crash. It was the first time that Capt. Oh had met Capt. Lee, and they flew two flight segments: ICN-NRT and NRT-ICN.

Asked about his general impression of Capt. Lee's style of flying, Capt. Oh stated that he did not know exactly but he was personally impressed that Capt. Lee's flying that day was not very well organized or well prepared. This was his first impression. When asked to clarify and expand, Capt. Oh stated that Capt. Lee did not comply with a lot of procedures. For example, ICN had a special noise abatement procedure with which Capt. Lee did not comply. There was a delayed flap operation procedure with which he also did not comply at their NRT destination. Capt. Oh stated that Capt. Lee should know the special procedures for an airport but that he did not. Asked to describe the specific procedure, Capt. Oh stated that there was a noise abatement procedure at ICN with a special procedure depending on the runway in use. On that day, they departed on runway 15, and company procedure specifies that airspeed should be maintained to flaps up speed plus 15 kts below 3,000 feet. However, Capt. Lee allowed the speed to increase below 3,000 feet. Speaking of the NRT arrival, Capt. Oh asked Capt. Lee if there was a specific procedure to be conducted. Capt. Lee responded that there was no such procedure. Capt. Oh then proceeded to show him the procedure in the manual, and Capt. Lee said that he now understood.

Capt. Oh was asked if there was anything that he recalled Capt. Lee doing particularly well. Capt. Oh could not recall anything. Capt. Oh was also asked if he could recall anything else that Capt. Lee did poorly. Capt. Oh stated that he told Capt. Lee about something bad but it seemed as though Capt. Lee did not take the corrective advice very seriously. His attitude was a little casual or a little careless. Capt. Oh was also asked for another example. Capt. Oh used as an example that Capt. Lee gave the okay to disconnect ground power without confirming that APU

power was available and ground power deselected. Capt. Oh further clarified that a pilot must switch to APU power before disconnecting ground power.

Capt. Oh was asked if Capt. Lee conducted a crew briefing. Capt. Oh stated that it is the procedure before starting flight to have a joint briefing with crew members which Capt. Oh observed Capt. Lee conducting. Capt. Oh described the briefing as a “very, very short casual briefing” with crewmembers.

Regarding the trip to NRT, they flew an ILS approach to runway 16L. Asked how Capt. Lee performed during the conduct of the approach, Capt. Oh stated that everything was acceptable but that the final approach course was a little bit lower than a normal path, but that it was acceptable. Capt. Oh stated that runway 16L at NRT was shorter than a “normal airport” and believed that Capt. Lee tried to reduce his landing distance, but he was not sure. Capt. Oh was asked if he thought Capt. Lee flew low intentionally. Capt. Oh stated that he was not sure. Capt. Oh mentioned to Capt. Lee that it was not a good approach and that weather conditions at NRT have many days with strong windshear or terrible wind conditions. Capt. Oh recommended that Capt. Lee should try for a normal approach and landing for flight safety. Capt. Oh was asked if he could remember the altitude when he noticed Capt. Lee was going low. Capt. Oh stated that his path was going low at an altitude of 200-100 feet and felt his descent rate was a little high. When Capt. Oh was asked to confirm that Capt. Lee was low at 100 feet, he said yes.

Capt. Oh was asked if he remembered when the autopilot was disconnected and said that it was manual flight and was not sure of the altitude, maybe around 1000 feet.

Capt. Oh was asked if Capt. Lee made any standard callouts when he disconnected the autopilot. Capt. Oh said that Capt. Lee said, “manual flight” and that, as the PM, Capt. Oh responded “flight director” because the AP had changed to FD on the FMA. Capt. Oh also mentioned that some pilots disconnect the autopilot with a single click so that an aural sound is heard but that Capt. Lee clicked quickly twice so that no aural sound was heard. This is acceptable, according to Capt. Oh. Capt. Oh was asked if he has turned off the FDs. He responded no because it was an ILS.

Capt. Oh stated that they also flew an ILS approach on their return into NRT. The weather was not very good with 1400 meters RVR but a fluctuating ceiling of 200 feet. Capt. Oh stated that Capt. Lee did not mention the bad weather conditions before the approach and Capt. Oh had to ask him about his intentions for the approach. Capt. Lee had not mentioned the poor visibility in his briefing, and Capt. Oh was concerned that Capt. Lee would make a manual landing with the AP off at 1,000 feet. Capt. Oh recommended to Capt. Lee that he should make an autoland which he did.

Capt. Oh was asked if they had received any special speed or altitude restrictions from air traffic control on their flight during either of the two flight segments. He said no. Capt. Oh was asked if it is common for pilots to get speed and altitude restrictions in Korea. Capt. Oh stated that there are speed restrictions in NRT but that the restrictions in SFO are totally different as it is right before the final approach. He said that he was referring to the restriction during the descent to maintain 180 kts until 5 DME which is not a common restriction.

Capt. Oh was asked how many OE flight segments Capt. Lee had flown before they flew together. Their flight was Capt. Lee's fourth flight on his OE and there were three flights prior to him flying with Capt. Lee. Since one of those flights was a NRT flight, this was the second NRT flight for Capt. Lee. Capt. Oh confirmed that the captain OE is 20 landings in 60 hours.

Capt. Oh was asked if Capt. Lee was making normal progress. He said that he was not sure and that it was clear that his flight with Capt. Lee was not very good. Capt. Oh was asked why Capt. Lee did not do well on the trips with Capt. Oh. He said he did not know if it was inappropriate for him to answer because he had only flown with him this one time.

Asked whether he felt that Capt. Lee's experience on A320 affected his flying on B777, he said he did not think so. He had asked Capt. Lee about his flying experience and Capt. Lee had told him that he had been a B737 FO, B747 FO and B737 captain as well as A320 captain. That was good experience for transitioning to the B777.

Capt. Oh was provided with written comments he had made on Capt. Lee's July 4<sup>th</sup> OE training record and asked if it jogged his memory about anything else that was noteworthy about the flight. He said he had discussed everything that was noteworthy.

Capt. Oh was asked to describe Capt. Lee's systems knowledge on the B777 in general. He said it was very hard to say how well he understood the systems because he had just flown with him one time on two short flights. They did not have much time to talk about systems. Asked whether there was anything unusual about Capt. Lee's use of the autopilot flight director system (AFDS), Capt. Oh stated that during the descent, his descent profile was not very good, looking at what kind of automation modes he was using. Flying as an instructor pilot, he got to know how well the transition pilots understood the automation system by looking at what kind of mode in special cases. Capt. Lee did not seem to understand the system very well during the descent profile. For example, Capt. Lee did not make a VNAV path approach in the beginning from top of descent. That was not unusual, it was common for transition pilots. Asked what vertical mode Capt. Lee used, he said VNAV, but Capt. Lee did not capture VNAV path. It just remained in VNAV speed. Asked how the airplane behaved differently in that case, he said it went above the path. Asked whether that meant they ended up high, he said yes and maybe after that the student pilot would try to lower the path and use a different mode like FLCH. Asked to clarify whether they might get a little high and use FLCH to get down, he said yes, it was during the descent, so it happened. It was at FL 200 or FL 350. It did not make a problem, it was just what mode he selected for that circumstance. Asked whether VNAV path would provide the most efficient descent, but this strategy would provide a less efficient, high descent that the pilot would have to correct, Capt. Oh said yes.

Asked whether Capt. Lee used FLCH close to the ground, Capt. Oh stated that the ILS pitch mode, G/S, was captured so Capt. Lee did not have to push FLCH.

Capt. Oh was asked if Capt. Lee expressed any uncertainty about his knowledge of how to use the AFDS and responded that he was not sure.

Capt. Oh was asked if he would feel stressed conducting a visual approach with just PAPI available and no glideslope. He stated that it is not normal but that he had experienced the situation many times in the U.S. so that he always tried to get ready for it. He further stated that sometimes it was not very comfortable so that he always tried to get ready for any unusual speed restrictions or altitude restrictions.

Capt. Oh was asked if he had enough practice so that he would be pretty good landing with no glideslope. He responded that it is not a normal approach but depended on speed and altitude restrictions. Sometimes an ATC controller gave very strict restrictions for speed and altitude that sometimes made the approach very unstabilized. He further stated that it was very hard for pilots to make a stabilized approach with altitude and speed restrictions on very short final. Capt. Oh was asked if that situation occurred very frequently at SFO and responded yes. Capt. Oh was asked how frequently he had flown into SFO. His response was that he had flown into SFO about once every three months for the past ten years. When asked how challenging SFO is for pilots, Capt. Oh stated that SFO was a very challenging airport as compared to other airports.

Capt. Oh was asked when he first met Capt. Lee on their July 4<sup>th</sup> trip. Capt. Oh stated that the flight was an evening flight to NRT and that he had met him late afternoon in the lounge. He did not notice any special behavior or special activities. Capt. Oh was asked what is the standard show time and responded that it was normally one hour twenty minutes prior to departure but that training flights require a show time an additional thirty minutes earlier, so a total of one hour fifty minutes before departure time. Capt. Oh arrived early, about two hours ten minutes before departure and Capt. Lee was already in the lounge but did not say how long he had been there. Responding to questions, Capt. Oh stated that Capt. Lee did not mention anything about stresses in his personal life and appeared to be rested, “just normal”. The last time Capt. Oh saw Capt. Lee was after debriefing from their flight, sometime after 2200.

Capt. Oh was asked if he was familiar with the low speed protection on the B777 and responded that he was. He was asked how it functioned and Capt. Oh responded that as airspeed decreased to minimum maneuvering speed, the AT automatically became active. He was asked what the low speed protection did when it activated and responded that the AT automatically increased in speed mode. He was asked if there was anything required in terms of “on” or “armed” switches. Capt. Oh responded that even though the armed switch was off, that it was automatically active but that there were special modes like the Hold mode where it did not automatically activate. Capt. Oh was asked if there was any kind of aural caution if the speed became low enough for the low speed protection to activate. He responded, “stick-shaker” and also EICAS message, “airspeed low”. He was asked if the EICAS message would have occurred before the stick shaker and responded that the airspeed low message, followed by the stick-shaker. He was asked if there was any kind of sound that accompanied that airspeed low indication and responded no.

Capt. Oh was asked if he knew about the hold mode effect on low speed protection before the accident. He said that he was a groundschool instructor and he emphasized hold mode to pilots, especially while on ILS and final. He stated that autolands were not possible with the autothrottle in hold mode. When asked if this was something that he pointed out specifically as an instructor, he said yes.

Capt. Oh was asked what would happen if you selected FLCH after putting 3,000 feet in the MCP altitude window. He responded that the airplane would try to climb and that the throttle levers would increase in Thrust mode. He was then asked what would happen to the thrust mode if the AP was disconnected and throttle levers were pulled back all the way. He responded that the throttles would try to increase but after some time, they would change to hold mode. When he was asked what would happen if his hand off the thrust levers at that point, he stated that they would stay in that position in hold mode. He was asked what would happen to the speed if the aircraft nose was held up to maintain a 3-degree glidepath. He responded that if the pilots tried to follow the glidepath from a lower path, the speed would be reduced. It depended on the pitch mode. The thrust would maintain the hold position, idle because the pilot grabbed the thrust. Whether it remained in idle would depend on the pitch mode. The pilot could push the nose down and speed would be increased or he could pull up and speed would be decreased. Capt. Oh was asked what would happen if both flight directors were cycled off and then turned one flight director back on. He responded that it would make the thrust mode change to speed from throttle hold. Asked if it would then go back to following selected speed in the MCP and he said yes.

Capt. Oh was asked if someone would make a callout if FLCH was selected. Capt. Oh stated that the PF should make a callout if they press any button and that the PM should announce, "Check". He was asked if that was the same policy whether the AP was ON or OFF. Capt. Oh stated that it was the same except that without AP, the PF should call out the order and the PM should push the button.

Capt. Oh was asked what altitude should be used to determine if an airplane is stable and continue during a visual approach. He responded 500 feet. He was asked at or below 500 feet, could either pilot call for a go around which must then be made. He said yes. He was asked specifically if it was acceptable for a captain in the left seat who was being instructed to make the decision to go around. He said yes. He was asked if it would be acceptable for an FO on a regular flight to say, "we're unstable; we're going around". Capt. Oh responded that the company procedure stated that the PF must call out intentions at minimums of landing or go-around and PIC would answer. He further stated that in a dangerous situation, if safety was compromised, that anybody could make a go around. He was asked if this situation was discussed in CRM training and responded yes.

Capt. Oh was asked what he would be monitoring as IP below 500 feet during a visual approach. He responded, "the whole thing if stabilized, but first priority is stabilized approach." He was asked if he would look more frequently between 500 feet and 200 feet if there were 3 reds on the PAPI, even though the airplane was verified stable at 500 feet. He responded that he would try to check everything – glidepath, FMA, and AT simultaneously. Asked to clarify where he would direct his attention, Capt. Oh said glideslope, glidepath, on course, simultaneously, and monitor the FMA on the PFD.

Asked how he felt about his company's safety culture and management's commitment to safety, Capt. Oh said that it was just normal. He said that he only worked at this airline. Asked if he felt positive it, he said yes. Capt. Oh was asked how he would communicate a safety concern to management. He responded that he was just a pilot and not very much involved in the management system. He was asked if there were mechanisms for him to make safety reports. He

responded that if there was an irregular flight or something similar that they had a captain report system and a penalty-free system and just a flight report system. He said pilots would report things to the company that adversely affected flight safety through that system. He was asked if he had ever made a safety-related report. He said yes and gave an example of a report submitted on narrow taxiways for the B777 at certain airports.

Capt. Oh stated that he understood FLCH scenario detailed in the questioning above before the accident occurred.

Capt. Oh was asked if the airline had been growing a lot in terms of the number of pilots, and he responded that he thought so. When asked further about growth in the B777 fleet, he stated that recently there were many captains that transitioned to the B777 from B737 and A320. He stated that there are more B777s coming at the end of July which would mean that a lot more B777 captains would be required. He was asked if this growth affected the quality of pilots selected for the B777. He said no. He stated that he did not think so and further, that the B777 is the airplane that most of the captains want to transition to when moving from the Airbus. He stated that the B777 is one of the most favorable airplanes and very popular among those pilots. He also stated that even if there are many pilots that transitioned, that they were still rigorously selected.

Capt. Oh was asked if Capt. Lee was good at making callouts for mode changes during the July 4, 2013 flight, and Capt. Oh responded that he was. Capt. Oh was asked about his comment on the OE Training record of July 4<sup>th</sup> which showed an assessment of “Fair” for Section D2 – Takeoff Technique and asked if Capt. Lee had under-rotated the airplane. Capt. Oh said yes and that his pitch was lower than normal and responded to a further question that under-rotation would cause the airplane to be fast in the climbout. Capt. Oh was asked and stated that the minimum altitude for AP engagement on takeoff is 200 feet. He was then asked if Capt. Lee engaged the AP at 200 feet or climbed manually. Capt. Oh stated that he believed that Capt. Lee had engaged the AP after takeoff at about 500 feet but was not completely sure.

Referring again to the July 4th OE Training record, Capt. Oh was asked about the item I-7, Approach Aiming point, assessment as “fair”. He was asked if Capt. Lee made any comment about what the airplane felt like. Capt. Oh said that he did not make any comment. Capt. Oh was asked if Capt. Lee was trimming the airplane appropriately during takeoff and landing. Capt. Oh stated that he was and that there was “no problem”. He also stated that we don’t use the trim. Asked when he was in VNAV if Capt. Lee was observant of the FMAs, Capt. Oh said that he was not sure. Capt. Oh was asked if Capt. Lee used both hands on the yoke, and Capt. Oh responded that one hand was on the wheel and one hand on the thrust levers.

Capt. Oh was asked how he debriefed his comments with Capt. Lee. He stated that he debriefed in the airplane at cruise and mentioned several items that had occurred during the previous flight and that after landing, he continued to debrief as the passengers were deboarding. He stated that most of the comments were done during cruise and that the last part for landing was done after landing. When asked, Capt. Oh said that Capt. Lee was receptive to his comments.

Capt. Oh was asked if the emphasis on thrust modes mentioned earlier in this interview was a result of Capt. Oh’s own initiative or part of a curriculum. He stated that during ground school he



was teaching the training manual. Capt. Oh was asked if he had rated any pilots as “Poor” on the OE Training record form. He stated sometimes but that it was a very, very special case. He was asked if a pilot was assessed as poor, would additional action be required. He stated that if he graded something as poor, that he would need to report to the B777 team.

Capt. Oh was asked if he has seen the OE records from Capt. Lee’s first three training flights. He stated that he had asked Capt. Lee to bring the training records for him to review since he did not know him. Capt. Oh stated that he reviewed the training records and did not find any special things from the three previous flights. He was asked if he recalled Capt. Lee sharing any particular comments about his training experience or experiences from the first three legs of his OE. Capt. Oh did not remember any particular comments that Capt. Lee made in this area.

Capt. Oh was asked about his statement earlier in this interview about being uncomfortable flying into SFO because of ATC clearances. He was asked if the pilot had any options or choices when they were given difficult clearances. He stated that there were not many options but that if they were given a specific speed and altitude restriction that might adversely affect a stabilized approach that they might try to configure a little bit earlier than what they had been directed. He was asked if he would notify ATC and stated that he would not as SFO was one of the busiest airports and there was no time between radio contacts.

He was asked what the effect would be on his workload if he was on final approach and had not received his landing clearance. He stated that it would not be a big deal but that it was very stressful when you were on short final without any landing clearance and you were waiting for a possible go around, so it was stressful.

He was asked if he knew before the accident about the scenario of a visual approach with AP off, AT HOLD mode, FDs both off, speed mode and descending, and Capt. Oh said that he did. He was asked where this was described and responded that it was in the FCOM. Capt. Oh stated that it was not really specified that it would change to speed mode. Asked how it was written, he said that it was written that the AT would automatically activate.

Capt. Oh was asked if he had learned through training or experience that low speed protection was not provided in HOLD mode. He responded that he had learned this ten years ago when he started to fly the B777 but he was not sure whether it was from training or experience. He was asked if other B777 pilots knew this and he stated that he believed some knew and some did not know. He did not know how many and did not know the percentage.

Capt. Oh was asked what would happen to a trainee captain who got four red (PAPI) on final. He responded that it would be documented in the training record and that it would be a big deal. He was asked what would happen to the trainee after the flight. He stated that it would be included in the comments and that most instructors, after reviewing this record, would try to correct the student pilot’s flying skill.

Capt. Oh was asked if the trainee captain would be taken off flight status, and Capt. Oh responded that it would be in the comments, or that if it was a big deal, that it would be reported to the B777 team. Capt. Oh was asked if a trainee captain would be worried that he might fail the

flight. Capt. Oh stated that the SFO flight was not a check flight, just a training flight so there was no fail in a training flight. Failure or satisfactory was determined only on a check flight so that Capt. Lee did not need to worry about failing. Capt. Oh was asked if Capt. Lee has received another bad review from an instructor, would Capt. Lee have been in trouble. Capt. Oh responded no as this was only his fourth flight. He did not think it was a big deal as Capt. Lee was going to have six more flights.

Capt. Oh was asked to clarify whether Capt. Lee was not receptive to feedback. Capt. Oh said he made comments on the ground and in flight that Capt. Lee needed to pay attention which was a very basic skill. Capt. Oh's observation was that Capt. Lee was not carefully monitoring, examining or focusing on the operation and that he accepted Capt. Oh's advice "very lightly". Capt. Oh thought that Capt. Lee should be embarrassed and humbly accept his comment and maybe apologize. However, that was not the attitude that Capt. Lee had which was opposite to Korean culture. Capt. Oh described Capt. Lee's attitude as "what's the big deal" and he recalled that Capt. Lee accepted his advice "lightly".

Capt. Oh was asked further if Capt. Lee was told to pay more attention to the operation or told to pay more attention to a lot of things. Capt. Oh referred to the example of not following the noise abatement procedure which was very basic. He stated that Capt. Lee should have been more humble because it was a very basic item but that his attitude was not embarrassed and that he responded "very lightly". Capt. Oh felt that his attitude on the way to NRT was not seriously focused on operating the right way. Capt. Oh was asked if Capt. Lee responded lightly to other feedback. Capt. Oh stated that Capt. Lee commented, "Okay" when he was completing the overall debriefing. It was not that he did not accept the advice, but that he accepted it "very lightly". Capt. Lee's light response pertained to the whole review; his attitude was not serious enough.

Capt. Oh had no other comments to make.

The interview concluded at 1552.

**Interview:** Ha Jae Wook, First Officer, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 31, 2013, 1615 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Mr. Ha stated the following:

He was a FO on the B777 and he was 43 years old. He had flown with Capt. Lee Jung Min as an FO. He had not flown with Captain Lee Kang Kuk. His current title was B777 FO and he had no other assigned duties at Asiana Airlines. His date of hire was March 2008. Before he was an FO on the B777, he was on the B767 for three years. His total flying time was 5,600 hours with 662 hours on the B777.

He had flown with Capt. Lee Jung Min on April 14, 2013, from ICN to New York, and on April 16 from New York to ICN. That was the only time he had flown with Capt. Lee Jung Min. His impression of Capt. Lee Jung Min was that he was really good in CRM and easy to fly with. For example, he said that Capt. Lee Jung Min followed all the procedures and made all of his callouts. Capt. Lee Jung Min made him feel very comfortable when flying together and created a situation where he was not reluctant to make a callout, give advice, or make a recommendation. When asked if he had prior experience with other captains that made it hard for him to make a callout, he said no, he had not had that experience.

He did not recall anything that Capt. Lee Jung Min did especially well during the flight, and he did not recall anything Capt. Lee Jung Min did less well. He was the PM on the flight to New York and the PF on the flight to Incheon. Nothing unusual happened on either flight. On the approach to ICN he flew an ILS and changed to manual flight with a manual landing. He disconnected the AP about 1,200 feet. Capt. Lee Jung Min did not make any special observations or say anything about the way he was flying. His landing was pretty good.

When asked if there was anything that investigators had not asked about that he thought they should know, he said no.

The interview concluded at 1626 local.

**Interview:** Park Ki Chang, First Officer, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 31, 2013, 1635 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Mr. Park stated the following:

He was a FO on the B777 and he was 42 years old. He had been in that position for the last 10 months. He was hired by Asiana Airlines in 2008. Prior to being assigned to the B777, he had flown for 3.5 years on the A320. He did not remember flying with Capt. Lee Kang Kuk. He thought he had flown with him on the A320 but did not remember when. He thought they had met several times at the airport or in the office because his face seemed familiar, but he did not really remember if he had flown with him. He had flown with Capt. Lee Jung Min about two months ago. He did not remember where they had flown together. He did not keep a personal logbook. The company logbook was electronic and it did not keep a record of who he flew with.

He did not remember anything about Capt. Lee Jung Min's style of flying. He could not recall anything special. He did not remember when he flew with Capt. Lee Jung Min, and he said he would need to call scheduling to find out the date. Prior to the interview, the Asiana crew scheduling department told him that he had flown with Capt. Lee Jung Min twice, but not when, and he could not really remember. During the interview, the Asiana crew scheduling department confirmed that Mr. Park and Capt. Lee Jung Min had flown together on April 7, 2013, on a flight to Paris, France, and that Mr. Park was in the jumpseat. Mr. Park remembered that the flight had left on a Sunday and that when they arrived in Paris he had just gone to his room to sleep. He met Capt. Lee Jung Min the next morning for breakfast. He did not remember that he had been in the jump seat for the flight.

The interview concluded at 1652 local.

**Interview:** Park Ho Yeoul, OE Instructor Pilot, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** August 1, 2013, 0815 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Captain Capt. Park stated the following:

He was a captain on the B777 and was 53 years old. He was also an instructor for ground school, simulator and OE. He had been an instructor for five years and had been on the B777 for about 12 years. He had worked at Asiana for 21.5 years. He had flown with Capt. Lee Kang Kuk two times during OE training, but he never had flown with him any other time. He had flown with Capt. Lee Jung Min on the B767 before but not in the cockpit together at the same time. He was part of a relief crew on the same flight.

Asked for his impression of Capt. Lee Kang Kuk's style of flying, Capt. Park said Capt. Lee tried to follow the Asiana flight procedures. He flew only twice with Capt. Lee and the flight was Capt. Lee's initial stage in the training process, so there was not enough information to assess his style. Capt. Park could not remember anything special about Capt. Lee's performance and he could not remember anything Capt. Lee did that was not consistent with normal procedure.

The OE flights they had together were from ICN-LAX (Los Angeles), LAX-ICN, ICN-LHR (London Heathrow), and LHR-ICN. Capt. Lee Kang Kuk was the PF on all those legs. Asked what approach and landing they flew into LAX, he said ILS24R. It was daytime, the weather was pretty good, and the visibility was over seven miles. Asked whether he recalled when flying the approach if the captain disconnected the AP or flew the approach with the AP all the way, he said AP disengaged at about 1,000 feet. Asked if he remained on the glide path all the way to landing, he said yes. Asked if he was given any speed or altitude restrictions by ATC, he said no. Capt. Lee performed the approach well.

The approach to ICN was also an ILS approach. Capt. Lee disengaged the AP at 1,000 feet. Referring to the OE training record which had been completed by Capt. Park, he was asked about comment item J1, "Use instruments and VASI to maintain path for final approach." Capt. Park said that on approach there was a flight path with VASI, and he told Capt. Lee he should continually follow the path or VASI. He told him to keep crosschecking and monitoring the display to keep up with the constant descent angle. He emphasized crosschecking and monitoring. Asked why he felt it necessary to make that comment, whether it was because Capt. Lee was off the glide path, he said he did not remember if he was really off or by how much, but he made the comment because he was "a little bit off the path angle." Capt. Park said you have to do crosschecking and monitoring to keep up the path angle at 200 feet. That is a very critical

moment to decide whether to initiate the flare or go around. That was the reason he made the comment.

Asked if Capt. Lee varied the pitch, Capt. Park said he gave Capt. Lee advice but did not remember if he did pitch up or pitch down, but had to adjust slightly to maintain the angle. Asked whether Capt. Lee ever got below the glide path, he could not remember, but this was a training session so he gave him advice. Capt. Lee was not really far off the glide path. Capt. Park said he would probably comment if the flight was too low or too high. It was just a training flight and he was trying to coach him on how to land.

The next flight was into LHR, and they flew an ILS approach, probably to runway 27R. According to Capt. Park's training notes, he indicated that Capt. Lee should limit speed to 160 knots. Capt. Park explained there was a restriction of 160 knots until 4 DME. The comment was to configure earlier, above 1,000 feet, in order to avoid configuring late. Asked whether Capt. Lee complied with the restriction of 160 knots until 4 DME, Capt. Park said Capt. Lee did a good job.

On the last flight to ICN, Capt. Park had made a comment about use of the VNAV path, but Capt. Park said yes, Capt. Lee probably did a good job.

Capt. Lee did not fly any visual approaches without an ILS during the OE flights with Capt. Park. Capt. Park stated that OE trainees are not required to fly a visual approach during the OE. Capt. Lee did not perform a go around during the OE flight with Capt. Park, but they did discuss the procedure and the go around procedure was part of each approach briefing.

Capt. Lee's proficiency was about average for his stage of training, and his knowledge and understanding of the AFDS (auto flight director system) was also about average.

Capt. Park explained that a grade of "fair" in an OE training record was an area where the student needed a little improvement or more familiarity. Asked to assess Capt. Lee's monitoring performance, Capt. Park stated overall Capt. Lee must be really good in other types of aircraft, which was why he was transitioning to the B777. Capt. Lee was in an early stage of training, so Capt. Park was giving advice to make sure to familiarize himself with all the systems. He recommended that Capt. Lee speed up monitoring of systems for the B777.

Capt. Park made a comment in Capt. Lee's training record on line Z4, "continue monitoring flight instruments and callout changes." Capt. Park stated his comment was not made because Capt. Lee did something right or wrong, it was just a recommendation to get familiar with B777 systems.

Capt. Park did not remember exactly why he rated this area fair and made the comment (one of only four things on the training form marked fair), but he thought when the IP was busy with ATC and didn't see something on the FMA, the PF must call it out too. Asked whether that actually happened during the flight, Capt. Park said it was just general. He did not think Capt. Lee did anything wrong.

Touchdown point and flare technique was marked fair on June 21, and there was a comment on line J1 about holding the nose of the airplane after 20 feet to prevent nose down movement. Capt. Park stated he understood that Capt. Lee came from flying the A320 and on that airplane you just hold the pitch for landing. He emphasized to Capt. Lee that the Boeing had a nose down tendency and you had to use back pressure to keep the nose from pitching down during landing. He told Capt. Lee he needed to prevent the nose coming down with the motion that he allowed.

Following a short break the interview resumed at 0955.

Capt. Park had made a comment on the training form line F5 on June 24 about instrument monitoring during cruise. He explained there was no incident and that Capt. Park was just giving Capt. Lee general advice. The comment on cruise really pertained to the whole flight.

Capt. Park thought Capt. Lee was confident in his ability to land the airplane.

When Capt. Park was asked if he felt confident making a visual approach himself with no glideslope and just a PAPI or VASI, he said yes, he did not think there was anything special about making a visual approach, with or without glideslope indications.

Capt. Park was familiar with the low speed protection system on the B777. Asked when and how it activated, he stated when the aircraft was at low speed or minimum maneuvering speed, there was a low speed message in the EICAS, and even if the throttle was off, the protection activated. The stick shaker activated and the low speed protection caused the airplane to go to target speed. If the AT arm switch was off, it was a different case. Approaching minimum speed, the airplane nose went down causing the airplane to accelerate to maintain target speed.

Capt. Park was asked under what conditions low speed protection would not work. Capt. Park stated that when AT and AP both fail, low speed protection would not activate if in direct mode or secondary mode. Asked if there were any indications on the FMA that low speed protection would not activate, he said no. Asked if there was a sound in the cockpit when the airspeed low message was displayed on the EICAS, he said he did not know.

If the airplane was at 2,000 feet descending and you selected 3,000 feet in the MCP altitude window and pressed FLCH, the throttles would automatically advance in thrust mode and the airplane would climb. If the AP was off and throttles were manually pulled all the way back, the airplane would not climb and the thrust mode would become "hold." If the throttles were released, the thrust mode would remain in hold.

Regarding approaches to SFO, Capt. Park stated that it was a busy, high traffic airport and it was necessary for crews to be alert. In descending they really had to pay attention.

Regarding OE debriefings, Capt. Park stated he provided advice and recommendations during the flights and also after finishing the trip. Capt. Lee was receptive to his comments and Capt. Park thought Capt. Lee made progress. Capt. Lee asked questions intended to improve himself during the flight.

Capt. Park had flown OE flights with other students five or six times since he flew with Capt. Lee. The number of times he flew with an OE trainee was variable, sometimes twice, sometimes once. He had never graded an OE trainee poor on an OE flight. If he did grade someone poor, it meant they would need to study more. For a poor grade the instructor did not call the chief pilot or a committee, but the report would be forwarded to the team, who would contact the trainee. Capt. Lee had made no comments to Capt. Park about his simulator training. As PF he turned off the flight directors on a visual approach, selecting them both off and the right side on. He never disconnected the AT.

At 500 feet on a visual approach with PAPI and no glideslope, checking outside was the main thing. There was no rule as to how often you check inside or outside. The PM had to continue to monitor the FMA and make callouts so he should be 50/50 with checking inside and outside but there is no written rule

He had not flown the Airbus. He had not noticed any special issues for Airbus pilots adjusting to control forces or low speed protection and did not see any special issues in transition for them.

The decision to go around depended on the situation, but normally the PF initiated it and the PM advised and made callouts twice. If the PF did not take action, the PM had to take the aircraft. The FD's were cycled off and one on during visual approaches because the PF might follow wrong information, so his side had to be off. The PM's side was left on to help him monitor. The information on the PM's side depended on the situation but it should be good information. The FMA should display VS, heading hold and speed mode.

The interview concluded at 1045.



**Interview:** Yim, Moon Sik, CRM Instructor, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** July 31, 2013, 1107 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Capt. Yim stated the following information.

Capt. Yim was an Airbus A330 captain for Asiana and lead instructor in their CRM department. He was hired as a pilot in December, 1993 and had more than 9000 hours total flight time. He held type ratings in the B737, B747-400 and A330. He did not have any flight time in the B777. He had been a CRM instructor for 3 years, and became a lead instructor after two years. He was 44 years of age.

He had received a lot of training to become a CRM instructor. He had completed courses in Basic CRM training and TEM courses at the University of Southern California (USC), International Air Transport Association (IATA), and the Korean Aviation University. All CRM instructors attended the Korean TEM course as a minimum, and an attempt was made to send them to the other courses as well.

Asiana had started their CRM training program in 2005 or 2006. The program had been developed in-house using material from USC, ICAO and IATA. All CRM instructors were Asiana employees. Initial CRM training consisted of a 3-day course. Although the international standard required only an initial CRM course, Asiana had instituted a one-day refresher CRM course based on a recommendation from LOSA audits. A pilot would go through the initial course and after 6 months of line flying and then attend the refresher CRM course. They also held a Joint CRM class about every three years which included flight attendants, mechanics, system operations controllers, and dispatchers. Pilots upgrading to captain or to a teaching pilot position were required to undergo seven hours of CRM.

Capt. Yim was responsible for the introduction of a voluntary family CRM course. Family members were invited to a one day course without the employee and were not compensated for their attendance. This was a new course that began last winter. The second trial was held this summer with about 70-80 family members attending. Feedback was positive. Topics discussed included the effect and source of stress on cockpit performance. Capt. Yim was motivated to start this course after he identified families and spouses as potential stressors as he was looking at what were common traps for men in their mid-40s. He identified families and spouses, in particular, as a common potential stressor. The course focused on educating family members about the safety aspects for a family member, especially since they enjoyed the privileges of being the family of a crewmember.

One incident in particular motivated Capt. Yim to start this course. Five or six years ago, Capt. Yim flew with an FO who was exhausted due to a lack of adequate sleep from having two one-month old children. This course was begun on his initiative. Capt. Yim stated that it was one of his first new initiatives although he had many other ideas. Asked whether the families attended without the pilots, he said yes and that they intended to separate the children from the wives so that they could talk to the wives separately. But, they met all together during the most recent training session. He wanted to make sure that the family members understood the factors that could affect safety of flight.

Asiana's recurrent CRM course was planned for an update after 100% of the pilots had attended. At the time of this interview, approximately 40% of the pilots had attended, due to scheduling challenges. Subject matter for the recurrent course was determined by Korean aviation law as well as guidelines from ICAO and IATA but they covered more than that. The CRM department had regular interaction with the safety department. The human factors committee in the CRM department communicated with the safety department. The human factors committee, safety, medical, and operations personnel met and talked about human factors and CRM issues.

Asked whether or not the company had an event review committee, he said that he did not have personal experience with that. Asked whether the CRM department could get incident information from FOQA if it wanted to update its materials, he said yes, they could put that material in their case study issues. During CRM classes, they had time to discuss case studies and they updated those with that information.

Asked how line pilots received information about safety-related incidents, he stated that the flight operations team distributed them through the company intranet and CreWorld. Consequently, most pilots knew what had happened before they arrived at a CRM class. During the class, they had times to discuss the threats and errors and the proper measures to counteract them. When asked whether case studies were deidentified, he said that pilot names and flight numbers were not mentioned in the case studies. When asked for a specific example that had been used in a case study, Capt. Yim could not recall a specific example.

TEM was taught to line pilots during initial training. CRM behaviors were evaluated with performance noted on their training and checking records. It was expected that CRM performance would improve during the course of training if a pilot received an unsatisfactory CRM score on his training record. It was possible to fail CRM after receiving a "U" for unsatisfactory on a checkride. Capt. Yim also stated that it was possible for a crew to fail a line check for unsatisfactory crew performance.

Capt. Yim stated that Asiana had a one-day six-hour instructor designation course for OE instructors. Capt. Yim was one of the instructors for the course and stated that they stressed the importance of the teaching pilot to create a good communication environment and to encourage students to speak up when they find something. He stated that if that environment is not created, that the pilot failed to create CRM.

Capt. Yim was asked if there were particular challenges for CRM within the Korean culture or was it easily adaptable. He stated that he had seen a change in Asiana after flying with them for

20 years. He described a nonprecision approach at Gimpo where the runway was not in sight after leveling off at 750 foot minimums. Capt. Yim was a brand new FO at the time. He asked the captain twice if he saw the runway and did not receive any response. Capt. Yim pressed the TOGA button, lowered his head and said to the captain, "I'm sorry, captain, but we have to go around." Capt. Yim said the captain was furious with his action, but Capt. Yim told him that if he kept doing that, he would have to report him. That was the only way to keep him silent. Asked if he had the support of management at that time, he said no.

Capt. Yim stated that a "generation change" had occurred since that time. He shared an experience from three to five years ago flying with an inexperienced FO who had advocated for a go around. Capt. Yim performed the go around and told the FO that he was glad that the FO had spoken up. Capt. Yim stated that young captains like himself had a different culture than the culture that existed 15 or 19 years ago. He also stated that he expected to see continued improvements in the flight deck culture.

Capt. Yim said there were 2,000 pilots at Asiana. He believed about half had military background. He was asked if there were any challenges between those with military background and those who did not have a military background He answered, "Not at all". He further stated that he had no doubt that he would get necessary and appropriate information from his FO, no matter what their background was. He also stated that there were always 5% of the pilots that were difficult. But he said that 95% of the pilots who came to his flight deck would say something.

He was asked if first officers would make a similar statement about the captains with whom they flew, that 95% of the captains create an environment conducive to speaking up. Capt. Yim stated that yes, he believed the first officers would make a similar statement.

Capt. Yim was asked if it was necessary to have a special discussion when there is an IP in the right seat training a left seat captain as to who is PIC and who can call for a go around. He replied that it was not necessary to have a special discussion because the topic was covered in their manuals. He was asked, in this situation, who was the PIC and stated that the instructor was PIC but that either pilot could call for a go around. He was asked if a student could call for a go around and said that they could.

Capt. Yim was asked how Asiana knew if their CRM program was working or was an effective program and if they were collecting any data. He stated that they were not collecting data yet but were looking forward to it. Asiana was also introducing a pilot self-evaluation card which would be one type of data. The pilots were supposed to complete the card and send back to the company after the flight. Capt. Yim stated that the card was one idea of quality assurance which would give them some metrics. Capt. Yim was asked further questions about the self-evaluation card. He stated the pilots would fill out the card starting in preflight and throughout the flight. The cards would be put on the briefing desk and pilots would be encouraged to complete them.

Capt. Yim was asked if they had received any specific feedback from their LOSA observations. He stated that a finding from their first LOSA was that the flight crew was not fully prepared for preflight preparation. Asiana investigated this finding by examining the briefing rooms. Their

finding was that the briefing rooms did not provide a good atmosphere for briefing. The area was re-designed with partitions, walls, and tables. This enhancement and change was a direct result of the LOSA finding.

Capt. Yim was asked if line pilots served as the LOSA observers. He said yes, that line pilots were the observers and that they served “as a fly on the wall”. The LOSA observers were trained by Quality Assurance and not by the CRM department.

Capt. Yim was asked if there were any CRM findings from the last LOSA. He stated that he did not recall any specific findings other than a recommendation for more seminars between CRM instructors to accomplish sharing ideas. Capt. Yim stated that they were holding CRM instructor seminars every six months and were recommending something more frequent.

Capt. Yim was asked what was done with the 5% of the pilots that he had mentioned earlier who were not receptive to CRM. His response was that those pilots were reported to the chief pilot. When asked what he expected would then happen, he stated that the pilot would be sent to another CRM course. If their performance was still unsatisfactory, the pilot would be sent to the CRM department for re-training.

Capt. Yim was asked if there was a scheduling policy that was designed to pair pilots in a certain way. He replied that they have a policy based on skill level in terms of flight time. He further responded to a question that the CRM department had not tried to modify the pairing policy.

Capt. Yim was asked if it was possible for a pilot to avoid flying with a certain pilot, which is called a “no-fly” list at some airlines. Capt. Yim stated that pilots do not have that option. Regarding their schedule, Capt. Yim stated that pilots could request certain days off for a holiday but that there was no guarantee that it would be awarded.

Capt. Yim was asked if he recalled a specific incident from 2005 involving an A320 tailstrike which occurred in Kansai (Japan). He replied that he did not. He was asked further if he recalled any policy that directed first officers not to make a go around as a result of the tailstrike event. Capt. Yim stated that he did not, but that first officers were allowed to make a go around.

Capt. Yim stated that he had not flown with either of the SFO accident captains. Capt. Yim did know Capt. Lee Kang Kuk as they were in ab initio courses in adjacent years so they overlapped in Vero Beach, Florida. He stated that he had known Capt. Lee Kang Kuk for approximately 10 years. Capt. Yim described the ab initio training which was conducted at FSI. Capt. Yim received his PPL, commercial, instrument and multi-engine rating. When Capt. Yim returned to Seoul, he received training on the B737 for one year and then became a B737 FO.

He was asked how well he knew Capt. Lee Kang Kuk. He stated that it was 19 years ago so they were not that close, but he knew him. He was asked if Capt. Lee was ever referred to the CRM department for additional training. Capt. Yim said that, as far as he knew, that Capt. Lee had not been referred. He stated that Capt. Lee worked in the accident investigation group and on the flight safety team as a safety pilot. He had never worked with Capt. Lee on any safety issues.

He was asked if there had been changes to policy as a result of the 2005 tailstrike and replied not to his knowledge.

Capt. Yim was asked if Capt. Lee was known as a pretty good student during the ab initio training. He replied that he was doing fine. Asked if he had ever flown with Capt. Lee during the ab initio training, he replied no.

Capt. Yim was asked if there were any emphasis areas changing in CRM recurrent. He stated that he had his own focus which was to encourage instructors to let their crew talk on the flight deck with special emphasis on a brand new FO. This point was very important for a captain, FO, and IP. Capt. Yim said that they were changing their focus on different courses right now.

Capt. Yim was asked if they had a fatigue module. He stated yes, they were inviting nurses from Asiana medical who studied fatigue and stress management. There was one hour dedicated to this during recurrent. He was asked if there was any special emphasis on monitoring skills. He said yes and that monitoring, automation, and situational awareness topics were included.

He was asked if mode awareness and mode errors were addressed. He said yes, they also discussed culture, communication, situation awareness, automation, stress and fatigue.

Capt. Yim was asked if they had an automation policy or philosophy. He said that if the workload was high, the AP use was recommended to reduce workload but that one needed to be aware of the possibility of an abnormality with the AP. If the likelihood was small, it was very important to be aware of the AP functioning.

He was asked why that was important if the systems were so reliable. He stated that it was important because the tendency was to rely on it and that could lead to a dangerous situation. Further, he stated that if the .001% happened and no one was watching, then they were not protected. A lack of awareness could lead to an accident. This topic was taught in a one-hour automation training class and during initial and possibly recurrent also. He was asked if training encouraged them to use less automation if the unexpected behavior occurred, and he agreed. He stated that was dangerous to not understanding what the automation was doing.

He was asked if the Guam accident in the 1990s influenced company safety programs and culture. Capt. Yim stated that for him personally, it was not the Guam crash but the KAL crash at Stansted because the accident covered both culture and communication. He stated that they used that as an example in CRM training. He stated that they know that bad culture and communication is dangerous and that they were learning the lessons from previous accidents so that they would not happen again. They discussed the influence of culture and communications.

Capt. Yim was asked if the topic was discussed of workload on the PM when the PF was manually flying. He stated that he did not teach that in his class but that the instructors who taught workload management would cover that topic.

Capt. Yim was asked who can do the call out in a mandatory go around condition. He responded that either pilot could call for the go around. If the PM notes that they have exceeded stabilized

criteria, he should call out the criteria. If there is no response after two callouts, the PM should take control.

Capt. Yim was asked if stabilized approach criteria included the PAPI light conditions. He stated no.

When asked, Capt. Yim stated that he nothing else to add or wished to share with the interview group.

The interview ended at 1215.

**Interview:** Kim June Soeb, OE Instructor Pilot, Asiana Airlines  
**Represented by:** Daniel Suleiman (Representative); Christie Hyosung Tang (Interpreter), Covington & Burling LLP  
**Date/Time:** August 1, 2013, 1400 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho Yong Sun-Asiana Airlines; Capt. Lee Dae Young- Korea ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Captain Kim stated the following:

He was a B777 instructor and was 56 years old. He had been an IP since 2008 and had been a captain on the B777 since 2001. He was hired at Asiana in 1992. He had never flown with Capt. Lee Jung Min but he flew with Capt. Lee Kang Kuk during his first trip on the B777 on June 16, 2013. The trip was from ICN to NRT and NRT to ICN.

Because he only had one trip with Capt. Lee Kang Kuk he did know Capt. Lee well enough to comment on his style of flying. Capt. Lee was transitioning from a smaller airplane to a larger airplane and made normal errors when below 500 feet. For example, during the landing he did not flare soon enough. Kim just pointed that out to Capt. Lee, and after he was advised he corrected. Another minor error was using the tiller during straight in taxi, and Kim advised him to use rudder.

The approach at NRT was an ILS and Capt. Lee disconnected the AP around 1,000 feet. Nothing about the approach was unusual until touchdown. The approach back at ICN was also an ILS with an AP disconnect at 1,000 feet. Asked if he required a pilot to do a visual approach on OE, he stated that they had no chance to do a visual approach around there. Asked if Capt. Lee did anything especially well or less well, Kim stated it was his first flight so he was not very aware of the B777, but he thought Capt. Lee was good. Capt. Lee did a crew briefing before departing ICN, and it was “perfect,” with a lot of information about the destination. When they met at the aircraft he briefed the flight attendants. The weather was good. There was some turbulence around 15,000 feet in Japan and Capt. Lee always turned on the seatbelt sign or used the interphone to communicate. During Capt. Lee’s approach briefings he discussed the go around procedure because it was part of the cockpit handbook they used for briefings. Cockpit communication went well. Kim thought Capt. Lee’s knowledge of systems and procedures was adequate and Kim suggested general areas of procedure for him to study.

Who called for a go around depended on the situation, but if the other pilot found something wrong, he could do it. Kim had been to SFO 70-80 times and had never done a go around there. On his last flight to SFO he was assigned an approach to runway 28R at about 14 to 16 miles out. As he approached the final approach course there was another aircraft arriving on runway 28L and ATC told him, do not pass that aircraft.

In order to slow quickly, he put the gear down, flaps, and speed brake, and adjusted the controls. That was it. That was one or two months before the accident. There was no visual cue on 28R;

the PAPI was NOTAM'd out of service. He did not set up a VNAV or RNAV glide path, but only used VS during the approach.

His total flight experience was 16,000 hours and his B777 experience was 7,000 hours. He felt Capt. Lee was above average on everything for his first flight. Capt. Lee had been an IP in the A320.

Kim found the visual approach to runway 28R at SFO difficult because there were no visual cues, just the runway. His ability to manage the vertical profile and avoid getting too high or too low depended on ATC's intentions. He was usually above glide path and did not have to make any last minute corrections. He had practiced the approach in the simulator but how often depended on simulator conditions and whether there was additional time available.

Asked if an autoland was ever done in training, he stated that new FO's were shown an autoland in order to show them the visual cues to landing. With a captain such as Capt. Lee they did manual flight.

When asked if Capt. Lee Kang Kuk was receptive to Kim's comments, he said yes. As an instructor in the right seat the PF in the left seat did the approach briefing. Regarding who can call for a go around, he stated everybody had their own measure. His rule was that if the other pilot was going wrong and was not adjusting, he would do it himself. He followed the POM and during the approach he put his left hand near the throttles and was ready. Discussing his own rule for go around, he re-emphasized that if he could not correct a wrong situation such as low speed, low altitude, wrong direction or high rate of descent, he would go around. He checked vertical speed in the PFD, and if the rate of descent was more than 1,000 fpm below 500 feet he must go around.

Asked if he would go around with three red and one white PAPI, he stated it depended on the situation. If he could adjust to two red and one white he continued, if not he went around.

He normally flew with the FDs on. They must be turned off on a visual approach and the PM side FD turned back on. The reason to turn the PM FD back on was to wake up the autothrottle. Regarding OE training form ratings, he could not remember if he ever graded someone as poor. He thought sometimes he did. In that event he would just tell the pilot himself about it. He did not fly with the AT off. He had flown with the AT in hold mode many times. That was normal during descent. When he used FLCH, the mode went from THR to HLD. This was normal. In that situation, the PM announced "hold" and the PF said "check."

Below 500 feet as PF without glideslope and only PAPI, the percentage of monitoring inside versus outside should be 50/50, because flying was basic and you must maintain proper altitude and airspeed. That was his own policy, and was not in the manual. The B777 flight training manual said on final approach, maintain the proper altitude for the distance from the runway.

When asked what might be helpful to our investigation, he stated he strongly requests that Boeing changed the B777 so that when the airplane was in AT hold and FLCH and flaps were set to 25 or 30 (landing configuration), the AT mode would return to speed mode. Sometimes the



FMA was still in hold after landing flaps were selected. This was his technical suggestion, and the reason to do it was that the crew might forget the thrust was in hold mode.

He was aware of the throttle hold function because he flew the B767, not as a result of the accident. He learned about throttle hold mode in training. He did not know if B777 pilots learned this in training or were aware of this.

The interviews concluded at 1500.

**Interview:** Shahab Taraji, Simulator Instructor,  
Cambridge Communications Limited  
**Represented by:** Declined representation  
**Date/Time:** Aug 2, 2013, 1030 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-  
FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho  
Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB;  
Alice Park-NTSB (Interpreter)

During the interview, Mr. Taraji stated the following information.

Mr. Taraji worked as a training center instructor and evaluator (TCI and TCE) at the Asiana Flight Training Center. He was a contractor, not employed by Boeing and was 65 years of age. He had been in his present job since October or November, 2006. This position was his only employment with Asiana. Prior to this position Mr. Taraji was a captain for KAL on the B747 classic and B777 from 2001-2006. Previous work experience included B747 classic captain for Southern Air for one year; first officer/captain/check airman/FAA designee B747 for Tower Air for eight years, 1993-2000. Before Tower Air, he worked for four or five years at a flight school in Santa Monica, California. Before coming to the U.S. in 1986, he was the director of flight standards, an instructor and check airman for Iran Air from 1968-1986.

Mr. Taraji had 18,000 hours total flight time of which approximately 100 hours were actual B777 airplane time. When asked why he left KAL for Asiana, Mr. Taraji replied that it was because KAL had an age limit of 60 years of age for retirement which he was approaching at the time while Asiana did not.

When asked who actually was his employer, Mr. Taraji stated that he was employed by CCL and that CCL acted as an agent for him. He was unsure as to what "CCL" stood for and guessed "Crew Communication Limited". He reported his hours to Boeing who paid CCL who then paid Mr. Taraji. He stated that it was not actually an employment but rather, an agency.

Mr. Taraji stated that he did not have any management responsibilities. He had responsibilities for check airmen and was a designated check airman for the Korean aviation authority which allowed him to give checkrides for training or transition and required authorization from Korean aviation authorities.

He was asked if he signed off pilot certificates for Korea and he responded that he was unsure. He stated that he checked applicants when their transition training finished and that he took a test every year to renew his check airman authorization. He stated that he gave checks but was not the final authority – that government inspectors gave the final approval.

Mr. Taraji was responsible for training in the full motion flight simulator. A pilot transitioning to the B777 received fixed based training from Asiana and then nine full motion simulator training sessions from the CCL instructors. Mr. Taraji conducted checkrides when the full flight

simulator sessions were finished. He stated that he did not conduct ground school, fixed based simulator, instructor or OE training and that he was not authorized to fly the airplane.

He was asked how many CCL instructors worked for Asiana and responded about 40 with six instructors who worked on the B777. He stated that the number of instructors has been steady for some time. Responding to a question about Asiana's growing the 777 fleet and needing more instructors, Mr. Taraji said he was unaware of any plans to increase the number of instructors.

Mr. Taraji was asked about the background of the other instructors. He stated that the instructors have a lot of experience and that three of the instructors each had several thousand hours on the B777. He stated that two of the instructors did not have any actual B777 airplane time. They completed their transition courses, got their licenses and became instructors. He was asked how long the instructors stayed. Mr. Taraji stated that their contract is based on "extended time", that it was a contract without a termination date although a 3-month notice was required for resignation or termination. Foreign pilots did not have a set number of years on their CCL contract but at KAL, there was a five-year contract.

Mr. Taraji was asked if he conducted new hire FO training. He said there were no new hires on the B777. All pilots on the B777 had flown other airplanes such as the B737 and A320 so that it was only transition training. Responding to a question, he stated that he did not know how Asiana selected pilots for transition to the B777.

Mr. Taraji was asked if he had trained or checked Capt. Lee Kang Kuk. He responded that he thought that he had done a couple of training sessions but was unsure. He knew that he had conducted an instructor check and perhaps recurrent check for Capt. Lee Jung Min. When asked about the proficiency level of Capt. Lee Jung Min, he responded that it was very good. He also stated that pilots already knew the training and checks as all of that information was on the crew website.

Elaborating further, Mr. Taraji stated that specific maneuvers were required which allowed him to change the sequence but not the events. Moreover, if he would try to change anything, he would be unable to fit all of the training into the two-hour block of time. He gave an example of flexibility for small changes that, for example, would allow him to change a below glideslope and recovery maneuver with a high sink rate and recovery maneuver. Mr. Taraji would change small maneuvers so that the pilot would not know what was coming up.

Asked how Capt. Lee Jung Min did on the check ride, he responded that he performed well. He was asked if he remembered anything the Capt. Lee Jung Min did particularly well. His response was that pilots go around every time something goes wrong while they are in the simulator – which is good but he was unsure if they would do that in the airplane. He stated that pilots in the simulator immediately go around as they are supposed to and as they are trained. The pilots are not supposed to take over the airplane and try to land it. The training was that if the PF feels the airplane was unsafe when less than 1,000 feet, that he would announce, "I have the airplane" and go around. Capt. Lee Jung Min demonstrated that in the simulator.

Asked if he recalled anything that Capt. Lee Jung Min did not do especially well, Mr. Taraji said that there was not really anything. He stated that he always told the instructors at a debriefing to keep up their knowledge. He repeated that he gave this message to all instructors. He added that he also asked all instructors if they wanted to be instructors and that the usual response was no. When asked why they would make such a response, Mr. Taraji stated his belief that they did not want to take the responsibility. When the company suggested that they become instructors, they accepted. He did not know if instructors received any additional pay.

Mr. Taraji was asked if the checkrides were different for an instructor as opposed to a proficiency checkride. He stated that every Asiana captain was trained on the right seat so that they were qualified for the right seat even before they become an instructor. Every year captains received right seat training including engine failures and go arounds from the right seat. The training profiles were different for recurrent proficiency checks, transition checks, and instructor checks. Mr. Taraji stated that the biggest change in the flight instructor check involved having the “trainee” left seat pilot intentionally make a mistake from which the instructor captain in the right seat was supposed to recover. The simulator instructor would have told the left seat trainee pilot via a discrete frequency what they were supposed to do. This scenario was only used for instructor training or an instructor check. Mr. Taraji stated that they told pilots for the other checks that they should let the other pilot crash in order to accurately judge their proficiency.

Mr. Taraji stated that the pilot in the other seat with Capt. Lee Jung Min was another instructor with whom he had been training. He stated that they knew each other and knew what was going to happen in the checkride. Mr. Taraji was asked what sort of direction he would discretely give to the left seat training pilot. He stated that he might tell the left seat pilot to over rotate on takeoff or to go below the glideslope or not to flare the airplane. He said that all of these: high sink rate, over rotation, below glideslope and no flare are all required. He was asked how low the maneuver would be set up below the glideslope and responded that he usually directed the maneuver at a low altitude so that as soon as it started, the instructor pilot would usually take over. These scenarios were all set up to occur at ICN. He mentioned that the training and check profiles were available from Asiana and that they follow each step.

Mr. Taraji was asked if he was similarly familiar with all of the specific checkride maneuvers while he was at KAL and he responded that he was. He stated that he would not have had familiarity of the checking maneuvers at Tower Air.

Mr. Taraji was asked if there were differences in the checkrides between some of the airlines for which he had flown and checkrides in Korea. He stated that at Tower, Southern, Iran and any other airline, that while you knew which maneuvers were required for the checkride, a sim instructor could do whatever he wanted and a pilot would not know if he was going to receive a fire, hydraulic failure or whatever. An instructor worked through the required maneuvers. In contrast, according to Mr. Taraji, everything in Korea was scripted. As an example, four sets of twenty questions for a proficiency check oral were posted on the website. Ninety percent of the questions were the same across all four sets so that basically the pilots had seen all of the questions. Mr. Taraji did not know if the answers to the questions were posted as he could only see the questions. It was a big surprise to Mr. Taraji to see everything scripted and everyone knowing what was going to happen.

He gave another example and said that if you looked at the recurrent training and check modules, you would see that two of the profiles are 99% the same. The transition used to be 11 lessons. It was reduced to 9 lessons and lessons 8, 9 and the checkride were all the same profile. The result was that the pilot was being trained for the checkride. Profiles and checks for instructor training were the same and that he was not authorized to change that. Mr. Taraji said that he had not seen a situation like this in another airline.

Mr. Taraji was asked if he had given many checkrides since 2006. He said yes and was asked how many failures he had seen. He said he did not remember but that he had failed a captain and first officer the day before this interview. He stated that he did not fail many because most of the time they were great. He was asked for some specifics of this particular failure which was a LOFT with a hydraulic failure scenario resulting in slow flap extension and the inability to raise landing gear once it had been lowered. The weather at the destination airport, Kansai, was below minimums which would require a diversion. If the crew extended the gear early before realizing that they would be unable to land at Kansai, they would not have enough fuel to reach their alternate, Takamazu. Mr. Taraji mentioned that the LOFT videotape was very helpful with his debrief of the crew since their recollection of their actions was different from actual behavior recorded on the video.

Mr. Taraji was asked if visual approaches and landings were part of the training curriculum. He responded affirmatively but did not know how many times. He stated that basically any kind of training had at least one visual approach. He said that most of the visuals involved a complete traffic pattern. When asked what sort of glidepath aids were available during a visual approach, he stated that pilots were allowed to program the approach into the FMC by selecting the runway and programming to field elevation + 50 feet to represent the desired altitude crossing the runway threshold. Asiana had specific procedures which also suggested setting up two arcs – one for three miles which would represent downwind boundaries and a two mile arc for final. They also extended the runway in the FMC. Normally, when the pilots announced that they had the runway in sight, the AP would be disconnected or failed by the sim instructor. Both the PAPI and VASI had been disabled so the only deviation indicator visible was a visual deviation indicator (VDI) on the ND.

Asked if pilots followed that procedure, Mr. Taraji responded yes. In line flying, pilots used the ILS where available, but they were required to practice the visual approach without glideslope guidance in training. He was also asked if he had a sense that some or all of the Asiana pilots had a lack of confidence or insecurity or uncertainty about their own ability to fly a visual approach. It was Mr. Taraji's opinion that manual flying was "a big scare for everybody". Mr. Taraji believed that pilots never flew manually because of concern that they would do something wrong, and the company would blame them if they go around or had a hard landing which was captured by FOQA. If a hard landing or go around was detected by FOQA, the company would pull them in and ask why they did that. The same thing was true at KAL. If autoland was available, they would always use it. Even the instructors did not want to practice a manual landing. Mr. Taraji had to fail the autoland so that they would have to land manually. Further, Mr. Taraji stated that he could tell the pilots were using the autoland when he was riding as a passenger commuting back and forth to the U.S. He believed pilots were reluctant to manually

fly the airplane. He said not every pilot was like that. They had some foreign pilots who liked to practice manual landings, however most of the Korean pilots did not want to manually fly the airplane. He stated that when reviewing the transition training syllabus, lessons 1-9, "Where is manual flying in that training? Where is attitude flying? Where do they teach them how much power and how much attitude they need to fly the ILS?" Asked whether it was not there, he said yes.

Mr. Taraji was asked if pilots were required to demonstrate an evacuation on their checkride. He said that it was not included in recurrent training but they usually did it once a year, in the second half of the year. When asked about the procedure, he stated that the checklist was on the back page of the QRH. The procedure involved stopping the airplane and contacting the flight attendant stations on the PA. If there was an engine or APU fire, they would shut down the engine or APU. If the fire did not go out, then they would read the last of page of the QRH step by step to evacuate. Asked the consequence from missing some of these steps, he stated that it would be a failure. Asked if pilots were given any evacuation scenarios where they needed to exercise pilot judgment, Mr. Taraji said he did not recall. He said one way in training that they initiated evacuation was with a landing gear collapse. However, this was not a catastrophic failure. He was asked if he thought Asiana pilots would deviate from the evacuation checklist and responded that he did not believe that they would.

When asked, Mr. Taraji stated that he did not know the process by which pilots were selected or promoted.

Mr. Taraji was asked what an instructor pilot should do if they got a little bit low on the glidepath. He responded that before 500 feet, the PM made the callout and waited for an appropriate correction. Below 500 feet the crew must immediately go around. In this case with an instructor pilot in the right seat, the instructor would take over and either make the go around or direct the PF to do so.

Mr. Taraji was asked what vertical deviation required a mandatory go around and stated that it was half a dot for visual approach.

Asked if there was a policy about using FLCH at low altitude, he stated that there was no policy about how to use FLCH. He stated that FLCH was added as one of two modes where the throttles could go to the Hold mode.

He was asked if he had ever seen a pilot not notice that they had gotten into thrust hold. He responded that he did not know but that eventually it goes away as they conduct the approach. He stated that when they disengage the AP, they were supposed to disengage both FDs and then re-engage one FD. He also stated that pushing VS would cause HOLD to go way. He stated that it would be rare for the speed mode to remain in HOLD.

He stated that there is no training on it because it was not in the Boeing manuals until a year ago when a big revision came out in July 2012. He stated that the manuals stated prior to the revision that if you were in VNAV SPD, the thrust levers might go to HOLD and that you would not be speed protected. The revision added that the condition could also occur while in FLCH. The

other change from this revision was a change to the stall recovery procedure. He stated that the revised stall recovery emphasized offloading the wings, gaining airspeed, and then adding power instead of focusing on a minimum altitude loss. He stated that every Asiana pilot was trained with these new procedures. He did not know if there was any groundschool or FBS changes as a result but perhaps. Asked if he had heard that thrust hold could trap you, he said no.

Asked who he reports to, Mr. Taraji stated Bill Dias and Rod McNaughton, who were the two chief pilots for the entire office. If he had something technical to report, he reported to the B777 technical pilot, Mr. Geekie.

Mr. Taraji was asked if he was familiar with OE training records. He said he never saw them. The training records were different, they were not divided by phase of flight. Asked whether he would be able to get a good idea of how someone was doing during OE by looking at the forms, he said that the same tolerances that they used during simulator training would apply to OE. During the interview, he was shown Capt. Lee's training form and instructor comments. He said that revision 27 of the flight crew check guide explained "fair" and "poor" and specified altitude and deviation tolerances.

He was asked to comment on what he read in the forms. He noted an instructor comment about avoiding flying into an area that the radar had painted red. He stated that if the pilot had done that, that it should be a failure.

He noted an instructor comment in CRM section Z-4, "Monitor and Cross-check", which addressed monitoring of flight instruments. He said this item was a big issue for everyone. A lot of people missed callouts, and this item was often marked fair or poor on training forms.

Mr. Taraji expressed his opinion that part of the problem was that when two pilots fly together, and a "general" was sitting in one seat and a junior FO sitting in the other, the FO would never make a callout. He said that in such cases he would freeze the simulator and ask the FO why he did not make a callout and the FO would simply say he was sorry. Mr. Taraji said he was confident that the FO knew what was happening when it was actually going on. He stated that the first question at KAL was to ask how old you are because you talk to an older person differently and the respect stemmed from age or rank. Mr. Taraji said that they were willing to sacrifice everything for that respect. Mr. Taraji said that these were his observations and rank was very important in Korea. He said that some FOs were good but not everybody. In a LOFT training situation an FO knew that he must make callouts or he could fail. Mr. Taraji stated that FOs in recurrent training were supposed to speak up if something went wrong but that they did not. He said that this applied to the majority of the FOs.

Asked if he had seen any improvements due to CRM, Mr. Taraji stated that things had changed drastically since Boeing started training. He stated that there were two crashes where the FO and flight engineer (FE) had known that they were going to die and they did not do anything. He cited the KAL accident in Guam and an accident in Manchester as examples. In the Manchester accident, the captain had a problem with his attitude indicator as he took off and went into a bank. The FE politely called out "bank angle" several times. Both the FO and FE knew the airplane was banking more steeply but did not do anything. Things had changed a lot since those

days. If something very dangerous occurred, the FOs would eventually speak up – but they would not do so for a situation like being a little below the glideslope. He stated, “Not everybody, but there are people who will not. It depends on the atmosphere in the cockpit.”

Mr. Taraji mentioned another comment on Mr. Lee’s OE form about Capt. Lee pushing back before receiving the cabin ready signal. He stated that it was an Asiana procedure that they must wait to receive a signal from the cabin. That the captain did not wait was important, but it would not be considered a checkride failure. Of much greater importance was the comment in item I-7 (approach aiming point) saying that Capt. Lee had made his initial flare prior to reaching the threshold due to nose down. He commented that, this meant Capt. Lee must have been very, very low when he flared. Mr. Taraji stated that he would consider that performance to be really bad. He continued that it is the instructor’s judgment as to whether such performance is a failure. However, the airplane should cross the runway threshold at 50 feet and not flare until 30 or 20 feet. He summarized by saying that there were two significant comments on the form, one was flare and the other was heading into a convective CB.

Asked how many checks he performed every month, Mr. Taraji stated that it varied quite a bit.

Changing the topic to Capt. Lee Jung Min’s training performance, Mr. Taraji was asked if he recalled anything about Capt. Lee Jung Min’s CRM behaviors, Mr. Taraji stated that is was normal and that Capt. Lee did what he was supposed to do.

Asked if he had heard anything indirectly about how the accident pilots had performed prior to the accident, Mr. Taraji said no. He continued, saying that the instructors did not hear anything about what happened on the line. He expressed his opinion that everything at KAL was transparent, but Asiana kept everything hidden. He said that he could not even look at the company web site. He did not know what was going on.

Asked if information collected by the safety program was fed back into training, he responded affirmatively, adding that when something happened, they included it in training profiles for recurrent training and LOFT. When asked for an example, he stated that a B777 landed in Saipan on a narrow runway and was forced to make a 180 degree turn and nobody was trained for that maneuver. As soon as the event happened, everyone was trained.

As another example he stated that they had changed their training immediately after the accident to include a visual approach from a high altitude of 6-7,000 feet with no PAPI at SFO. He stated that if you looked at the number of revisions for recurrent and transition training, you would see many. There had been two or three changes to the recurrent training curriculum this year already, and they were very good.

Asked if pilots coming through training understood the working of the low speed protection system, Mr. Taraji said that they do because they demonstrate it with the profile in both a clean and landing configuration. When asked if most pilots would know that it is not active in hold mode, Mr. Taraji confessed that he himself did not know that until a year ago when the Boeing revision came out.



Asked how often he conducted flight instructor training, Mr. Taraji noted that it varied from three times per year to having three in the last month. Sometimes he did not do very many checks. He was asked if pilots could try to select certain airman to fly with and he said he did not believe that was possible.

Asked if pilots selected a runway before an approach, he said yes, they selected a runway.

He said pilots always made the same errors until training changed.

He was asked about checkride failures. He stated that a failure automatically generated 126 text messages about the failure and that the pilot would be removed from the schedule. He state that he did not know if anything punitive happened or what Asiana's policy was in that respect.

Mr. Taraji was asked if pilots used route 2 in the FMC. He said they always did. They used it to plan for the alternate or to plan escape routes in case of engine failure or rapid decompression when flying over high terrain. He said the crews were familiar with route 2.

He was asked about crews turning off the FDs with both hands. He said that they did that at AP disengagement which was when the PF called for it off and one back on.

Mr. Taraji was asked if crews were required to annunciate FMA changes and he responded that they were.

Mr. Taraji was asked about his comment made earlier when he stated the Capt. Lee Jung Min had normal CRM and he was asked whether or not he would expect an FO to speak up when flying with him. He said he could not really judge. When he trained two instructors in the sim, they were equals.

He was asked if he noticed any difference in performance levels between pilots transitioning from the Airbus to the B777 compared to pilots transitioning from the B737 to the B777. He stated that he definitely did because if a pilot came from an Airbus or from flying with a stick in the military, he would have a "pain in his hand" and not know that he had to trim the airplane. He stated that B737 pilots have a much easier transition because the displays and terminology are similar. Asked whether he noted anything different in terms of the sight picture when transitioning to the B777, he said not really, but he noted that the manual flying was not included in the curriculum for throttle settings and pitch, etcetera, because manual flying of the Airbus was totally different from manual flying of the Boeing.

Asked if they conducted special airport qualification training, Mr. Taraji stated that the training center was very good and that they trained numerous approaches into JFK and SFO.

Mr. Taraji was asked if B737 was ever involved in making the simulation profiles. He replied that unfortunately they were not involved and their opinions were not wanted. He was asked if he had ever advised or recommended changing the last two sim profiles to make them different. Mr. Taraji stated that it had been suggested to their managers. They reported a lot of things to their

managers including errors in their forms. There had been procedural errors in the manuals which they had reported and those errors were slowly changed in the FOM and POM.

Mr. Taraji said that if the last instructor recommended more training or said that a student was not ready for the checkride, their advice was ignored. A student would go for the checkride even if Mr. Taraji said he was not ready. The forms they completed did not have recommendations, but just allowed for a statement of facts.

Mr. Taraji was asked if they held periodic meetings with the Asiana training team. He said that within Boeing, they held flight standards meetings every month. He said they invited the Asiana individual who made the profiles to attend and he came once but never showed up again. However, when a profile was prepared, the individual did send it to them and they made comments. Sometimes changes were made and sometimes they were not.

Mr. Taraji stated that there was not enough time to do everything in two hours and they used to have four hours. They accepted some of the instructors' suggestions but the number of malfunctions required could not be reduced. If training was four hours, they could do everything and retrain the pilot if something bad happened. The way the situation was at present, there was no time if something was not good. This was the extent of the participation that we had. They did not have meetings together.

Asked if transitions were always captains paired with captains, Mr. Taraji said that was true most of the time but sometimes FOs came through.

Asked why the simulator sessions had been reduced from four hours to two hours, Mr. Taraji said that he did not know why and that investigators would have to ask Asiana.

Asked why there were contract IPs at Asiana, Mr. Taraji said it was his opinion that KAL had so many crashes around 2000 that both the FAA and Canadian CAA gave an ultimatum that Korean airlines were not safe and that they would stop them from flying. At that time KAL hired Boeing and FlightSafety for training and Delta Airlines for flight standards and safety. They came in and started to change the culture at KAL. Capt. Greenburg at KAL changed all of their manuals and forced all of this age and rank relation out of KAL and made everything transparent to everyone with incidents and accidents. The pilot who had been involved in an incident would be identified and they would lose face. Asiana adopted the same policy that year with bringing in Boeing.

Expanding further, Mr. Taraji stated that it used to be that a high ranking guy from the Air Force could fail or promote anybody he wanted to. When Boeing came in, the instructors failed people regardless of rank, which was a big change and that was why they were still there. The sim instructor was not biased to the rank of the pilot in the seat. Mr. Taraji did not know if they had been a general or a chief pilot.

Mr. Taraji was asked if he would expect a crew on an ILS approach with a glideslope that failed during the approach to rebrief for lower minimums and continue or go around. He responded that if the weather was IFR, the crew would be expected to go around. If in visual conditions, he had a deviation indicator on the ND which could be followed or he could set up for a visual

approach. All of that had to occur before he reached 1,000 feet. Below 500 feet there was no set up or change. A go around had to be executed.

Mr. Taraji was asked if anyone conferred with him about what would be discussed in this interview. He said no.

Mr. Taraji was asked if there was a step in the evacuation training that involved calling the tower before evacuating. He replied yes. He stated that it was not in the checklist but the pilot would want to confirm with the tower to see if they could see a fire outside. If an emergency had been declared, a fire truck might be able to confirm a fire. This situation would be if the crew was not sure about the condition of the airplane. If they were sure, they would have to immediately evacuate. Basically, they wanted to confirm that there was actually a fire before they evacuated.

Asked if he was familiar with a change to the go around policy stating that only captains could make a go around as a result of an A320 tailstrike, Mr. Taraji said no, and the POM said both pilots could challenge to initiate a go around.

Mr. Taraji was asked if he taught the crews what to evacuate for and he responded that it was covered in ground school. The syllabus gave them a problem and expected them to do it correctly. On a recurrent check, the instructors did not tell them what they were supposed to do.

Mr. Taraji was asked if there was anything else that he wished to add or that he had not been asked that could help the investigators understand the accident, he said no.

The interview concluded at 1235.

**Interview:** David Whitelaw Geekie, Chief Flight Instructor,  
Cambridge Communications Limited  
**Represented by:** Declined Representation  
**Date/Time:** August 2, 2013, 1305 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-  
FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho  
Yong Sun-Asiana Airlines; Capt. Lee Dae Young- Korea  
ARAIB; Alice Park-NTSB (Interpreter)

During the interview, Mr. Geekie stated the following:

He was 72 years old and was the chief flight instructor for the B777. He had been in that position since 2007, and been a training center examiner (TCE) on the B767 previously. He had flown the B767-300, B727, B737, Electra, and DC6 at Canadian Airlines. His total flight time was 19,000 hours. He had been director of standards at Canadian Airlines and Pacific Western Airlines. He had no B777 flight time. He had been the chief flight instructor on the B777 since he arrived at Asiana. When he arrived, many instructors wanted to leave to go somewhere else.

Asked his duties and responsibilities, he said Asiana put together their own training profiles, but he communicated through his managers with the Asiana chief of training. They allowed him to make suggestions. When the profiles were official, he put together written material for the instructors and held standards meetings to try to be as standardized as possible. He also did quality assessments on the various instructors in his group. There were 5 B777 instructors in addition to him.

He agreed with Boeing that they should train as they fly and fly as they train, and they tried to do that as much as possible. There were a fair number of events in the profiles and they tried to make the events realistic when they could. For example on the present profile, their first segment had a number of little events and a cargo fire type of event and the instructor was supposed to reduce the fuel. He asked if they could just make it lifelike and come back in high speed and do the overweight landing. Asiana agreed.

He put together profiles for pilots on the iPad for pilots to use. The profiles were fairly busy and were done largely in real time. This allowed crews to manage as they would in the airplane. He did not like to reposition the simulator excessively.

He conducted the most recent proficiency check for Capt. Lee Kang Kuk in May. Capt. Lee had been on the A320 for several years. Geekie also conducted some IP training for Capt. Lee Jung Min and had probably seen him before, but he couldn't recall when.

Speaking of Capt. Lee Kang Kuk, Geekie thought his general proficiency was good. He did as good a job as any coming through the transition course. Geekie could not recall anything in particular but Lee performed the way he expected and didn't have any CRM problem with the other pilot in training, who was also a captain. Lee "jumped all the hoops" to satisfy him. He

could not think of anything Lee missed on the check ride. Lee was asked to fly a visual approach on the check ride. The last exercise was a single engine approach and go around with vectors back for a single engine visual approach which he performed very well.

There were visual approaches throughout the training, but they were controlled visual approaches. Most of these events started from downwind. They followed the Boeing approach profile, which was pretty much the same as documented in Asiana's POM. In the latest recurrent training, Asiana had added high dive, high speed visual approaches, which was perhaps something they had not done too much in the past. That was added after the accident. They set up for runway 28L at SFO and positioned the simulator 12 miles out 3 miles left of centerline, over Menlo and 7,000 feet with a clearance to maintain 180 kts until 5 DME.

The pilots he had seen had performed the new visual approach profile quite well. They did not set up for an ILS, but set the simulator up for a new visual approach procedure that simply used the runway with the runway threshold plus 50 feet on the legs page so they had a proper profile. The profile defaulted to three degrees and provided a visual slope indicator on the ND which went right to the runway. They used to recommend whatever was available. Even if the ILS was off the air, they selected that for slope and used it for additional information. For the visual approach, they put in a two mile circle for downwind and a three mile circle for final. Both Asiana and Boeing stressed 300 feet per nautical mile for slope. By setting it up that way, they could easily maintain a profile all the way. They stressed in training that the pilot should do that as much as possible. PAPI was available for them for 28R but not for 28L in the simulator.

Lee was transitioning from the A320. Asked if he had noticed difficulties for pilots transitioning from the Airbus, he said usually by the end of their training they were fine. They were accustomed to sidesticks and throttles that did not move, but by the end of training they were fine. He noted Airbus pilots did not tend to use rudder very much, and it was not required very much on the B777 either. After the transition training they were usually quite happy.

He was asked about how the B777 speed protection system was presented during transition training and if he gave pilots a situation in which the speed protection activated. He said the only time they saw that was in the initial transition session when they got a stall warning and AT wakeup demonstration. He said when Boeing changed their stall procedure a couple of years ago, he convinced Asiana that they should do that on a recurrent training session so the pilots could be familiarized with the change. Now, the only time B777 pilots saw the stall wakeup demonstration was on the initial transition session. The recurrent training on it was only introduced one time. He said on the other Boeing airplanes it was common to do stalls more often, but not on B777. Asked why, he said Boeing did not recommend it and he guessed that Asiana had accepted it. The Boeing syllabus only had it in initial transition. Mr. Geekie personally did not think that it needed to be done every six months. He did not know Boeings' reasoning, but he presumed it was because the safety features provided redundancy and made it a misuse of training time. However, Asiana had provided stall training when Boeing changed the B777 stall recovery procedure.

He was asked what did the current stall recovery involve. They demonstrated a stall with the AP on and using an AP recovery. If the AT master switches were off and thrust was idle, as the

airspeed got low, a line appeared in the altitude display and the AP engaged and pitched down. All you had to do was add thrust smoothly, allow the airplane to gain a few knots, push another pitch mode like FLCHG and fly away. They did that at maximum weight. The profile was to fly out of ICN at heavy weight, slow, disengage AP, and then demonstrate how to get out of the stall. They did the demonstration for the AP stall and then for the manual stall. The crews performed well. Asked how much pitch reduction was needed to recover, he said Boeing's procedure no longer emphasized minimal altitude loss, but emphasized breaking the stall. They went a couple of degrees down, enough to stop the stick shaker, added thrust and it worked well.

He was asked why Asiana had pilots like him here. He was not exactly sure, but he thought it was fairly common knowledge that FlightSafety Boeing was hired in the late 90s at Korean and he thought the president of Asiana decided it would be a good idea to have it done at Asiana too.

His work schedule and that of the instructors varied. They were doing 15 or 20 sessions a month. It was difficult for Boeing to get new instructors up to speed because they had to satisfy Korean air law. If training requirements went up with the airline, they were asked to do what they could to accommodate that. Some instructors liked a lot of time in Korea, a month at a time, and others liked to spend more time at home.

He conducted a training session with Capt. Lee Jung Min around the first part of June, 2013. There was just one training ride with him. Capt. Lee Jung Min was going through with Capt. Park Hong Nook. Mr. Geekie probably did training or checking with Capt. Lee Jung Min before that, but he could not remember. When the accident happened, nothing in particular came to his mind about either one of them. Capt. Lee Jung Min performed well enough in the simulator to make Geekie happy. He told new instructors that when they were in the right seat, they were chosen because of a higher level of proficiency. They had to do the FO's job and do it well, and at the same time they had to supervise the new captain in training. His advice was the IP should let the trainee do his job as much as possible but never go beyond their own comfort level.

Asked to discuss anything Capt. Lee Jung Min did well or poorly, Geekie said both pilots in Capt. Lee's training did well on the takeover training exercise, and they seemed eager in their new positions. Geekie was happy with Capt. Lee's performance.

Geekie's assessment of junior crewmembers ability to intervene when necessary was that it had probably improved a lot in the last few years and was on a par with where he came from. He thought they were willing to speak up, at least in the simulator environment.

He did all categories of simulator training, not just instructor training. When asked if he was familiar with the OE training form, he said no.

He was asked if he was aware of any thrust modes where low speed protection would not activate. He stated this was true of FLCHG and VNAV speed modes. When asked if the throttles would wake up and advance if they were in hold mode, he said no and there was a note in the FCOM to that effect. He said the note had been in the FCOM and he did not know if it was new.

They had been doing the setup for the visual approach using the FMS to set up the runway at least since he arrived in February 2007. They briefed it and stressed that the approach was visual and you had to look out the window. It made sense to use the nice equipment to set up the downwind and select the runway so you had a VNAV slope to monitor your profile. Doing this made it easy. Most of the visual approaches that were in transition training were downwind visual approaches, but there had been some that were straight in. Their policy in the past had been to select ILS on the runway. Quite often if you were going in, you might already have the ILS selected, and if you had a visual approach, you might extend the runway and you had your visual slope to the runway.

They still had a timing procedure in the POM as well that they used. It was to be abeam the threshold of the runway at flaps 5, about 1,500 feet, and after 30 seconds select gear down, flaps 20, speed brake, and set speed. After 45 seconds they disconnected the autopilot and turned back toward the runway. If there was a glide path, they would monitor it, and if there was a visual slope, they monitored that. It was most important to look out the window at the PAPI. They used all of these things to make sure they didn't go low or high.

He did not know how Asiana pilots were selected. He had not marked many pilots as unsatisfactory. There were a few on the B767 but not very many on the B777. The last B777 pilot that he found unsatisfactory was a North American pilot on contract. He thought there were probably more than 10 expatriate pilots at Asiana, and a few had come in recently from Japan.

He thought FOQA based safety information might make it into the training syllabus, but he wouldn't hear about it until the training was changed. He would prefer more communication in that respect. There was no difference in ability of Airbus and B737 trained pilots when they transitioned to the B777. It was an individual thing. He had seen some of each who were really good. Asiana had a fairly good selection process. He had not noticed any effect on candidate quality as a result of airline expansion.

Asiana pilots did manual landings more often than auto landings in training. The choice depended on what type of approach they were doing. They used the automation if it was a Cat II or Cat III ILS, or RNAV GPS or VOR. Asiana required certain approaches to be done manually in the simulator. The Cat I ILS was done manually in the simulator.

Regarding low speed protection, if the aircraft was in thrust hold mode and in FLCH, it did not automatically activate.

In recurrent training, they were doing manual landings and overweight landings at this time. Boeing did not recommend autoland for overweight landings. The second approach being flown in recurrent was the RNAV GPS for 28R. All approaches in this recurrent session were manual landings. In previous recurrent profiles, he would have had at least one or two manual landings and one or two auto landings for CAT II.

They did train RNAV GPS approaches. He did not perceive any reluctance or uncertainty or feelings of stress among pilots asked to fly visual approaches and landings when pilots were in the simulator. The only thing in the simulator was that the majority of approaches they did were

controlled visual approaches. The last couple of sessions they had done with high speed, high dive visual approaches, and the pilots coped with it just fine.

The reference in the Boeing FCOM for the AT was in Section 4-20-9.

No one had conferred with him from Asiana before the interview and nobody had said anything about the accident. Nobody warned him not to talk about anything.

He did not see why the SFO RNAV approach would cause Asiana any trouble, and he said he did not see why it should. He had not noticed a tendency for pilots to avoid manual visual approaches in training, checking or on the line. In fact, FOs wanted the practice and so did the captains. He had not noticed any reluctance from anybody.

When asked if there was anything else that he wanted investigators to know or thought would be useful for investigating the accident, he said no.

The interview concluded at 1420.



**Interview:** Choi Su Won, Aviation Safety Inspector,  
MOLIT Operations Safety Division  
**Represented by:** Declined Representation  
**Date/Time:** August 2, 2013, 1430 Korea Standard Time  
**Location:** Asiana Training Center, Seoul, Korea  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-  
FAA; Linda Orlady-Boeing; In Sun Suk-Korea ARAIB; Cho  
Yong Sun-Asiana Airlines; Lee Dae Young- Korea ARAIB;  
Alice Park-NTSB (Interpreter)

During the interview, Mr. Choi stated the following information.

He was 57 years of age. He was an aviation safety inspector and the principal operations inspector (POI) for Asiana Airlines. He had been the POI for Asiana for 6 months. Before that, he had been the POI for Korean Airlines (KAL) for two years. Before that he had been a captain on the B747-400 at KAL for 16 years. Asked whether he was the POI for any other airline, he said no.

Asked when he began working for MOLIT as an aviation safety inspector, he said he had taken that position when he retired from KAL 2.5 years ago. Asked who he reported to, he said he reported to the safety director in his government organization. Asked for the name of his organization, he said it was the Operations Safety Division. Asked if that was under MOLIT, he said yes.

Two POIs were assigned to Asiana. KAL also had two POIs. Low cost carriers (LCCs) had only one POI. The total number of inspectors in Korea was 51, but only 17 were licensed and certified. Those 17 were assigned to large carriers. There were probably three assigned to Asiana. There were two POIs and two principal maintenance inspectors (PMIs) assigned to Asiana.

Asked whether he had an organizational chart for his organization, he said he could prepare one.

Asked how many major carriers there were in Korea, he said there were two major carriers and six LCCs, for a total of eight airlines. Those airlines were overseen by 17 and 11 inspectors, for a total of 28 inspectors. The breakdown was as follows:

Operations safety – 17  
Airworthiness - 6  
Cabin safety inspectors – 2  
Dispatch inspectors -2  
Dangerous goods inspectors – 1

Asked whether he had a deputy or assistant POI, he said yes. He had exactly the same duty. His name was Lee Young Kwon.

Mr. Choi was asked what types of inspections he performed. He said he oversaw generally everything stated in the air operations certificate (AOC). They followed the AOC procedures. Asked whether Asiana had operations specifications, he said of course. Asked whether he could provide a copy, he said yes.

Asked to clarify what types of inspections he performed, he said they just followed a chart. They inspected training, operations, and maintenance. Asked if investigators could see the chart, he said there was an inspection manual with a 39-item checklist. They did whatever was specified on the AOC for inspection oversight. Asked if he kept records of the items he inspected, he said yes.

Asked how many items or inspections he typically did in a year, he said operations had 39 items, but maintenance had 45 items. Asked to describe some of the items, he said operations had 39 and maintenance had 45. Asked to give an example, he said they just based their oversight on ICAO procedures, and he could only say 39 items and 45 items.

Asked how many inspections he performed in a month, he said that they had a yearly inspection plan template for 2013. It contained 180 inspection items. Operations had 90 items and maintenance had 90 items. They divided up monthly how many items they would do. There was a separate monthly plan. Some items they performed 2, 3, or 4 times per year. They did some items more than others if those items had been a problem the previous year.

Asked whether Asiana had aircrew program designees or designated inspectors who did not work for the safety division, he said there was a scheduler and he just inspected as he was scheduled to inspect. He did not make a decision about where to go. Asked whether there were people who worked for the airline that were designated as people who could perform checkrides for the government he said yes, and he worked with them for the inspection. Asked how many designees there were at Asiana, he said they had four categories: training, quality, examination team, and safety management team. They assisted with training quality examination and safety management. Asked to clarify how many designees there were, he said there were about 10 people.

Asked what percentage of Asiana pilot check rides, in the simulator or the airplane, were done by him compared to how many were done by designees, he said that for the simulator they just delegated to the instructors from BTKS. He did not get involved. For OE they had 11 certified inspectors. In OE training the MOLIT only performed checks for captain's upgrade training. The rest of the training procedure was done by Asiana.

Asked whether he had records on how many events he and the other inspectors did for captain's upgrade training, he said yes. Asked how many he did in a year, he said he was not sure exactly, about 20. Asked whether those 20 were done by him, he said yes, him or another inspector. He said he didn't actually do it. They had 11 certified inspectors. Each aircraft had a different rating system, so there were 11 people, regardless of the carrier. 11 inspectors did them for Asiana, KAL, and the 6 LCCs. It was not done by him because the rating was a very important final check. Asked to confirm whether there were about 20 events this year, he said he was not sure about the number because he was not doing it himself. It should be more than 20.

Asked whether he did any flight examinations, he said yes, almost 10 times per year.

Asked whether he approved Asiana's training program, he said yes.

Asked whether he had to approve changes to Asiana's training program, he said yes, he had to review and approve changes.

Mr. Choi was asked whether it was true that the B777 training program used to include 11 simulator rides during transition training but the number had been reduced to 9. He said there were 11 simulator rides. By Korean regulation, the pilots had to have ten 2-hour sessions, and then complete a real 2-hour flight. They received a total of 22 hours of training. Asked whether Asiana had reduced the number of simulator training sessions for B777 transition training, he said 10 sessions totaling 20 hours was the minimum required. They had 22 hours. Asked again whether Asiana had reduced the number of simulator periods for B777 transition training, he said he had only been working as the POI for Asiana for six months, so he was not sure whether the number had been reduced from 11 to 9.

When asked if recurrent training had been reduced from four hours to two hours, Mr. Choi said that the training had been divided so that the pilots received two trainings lasting two hours each. He understood that they did a total of four hours. He said during the same simulator training session, the captain and FO would each receive two hours of training. Asked whether he knew if they had reduced the amount of training time, he said no.

He said that he was a POI, so he inspected the training procedures and if there was a comment they would follow-up. That was his job. The simulator profile was administered by a rating inspector, not by him. He suggested speaking with the B777 rating inspector who could explain the changes and procedures. He was not the person who inspected the changes on that. There were 11 rating inspectors. All the training inspection was done by them. The POI did not actually perform the inspection process.

Mr. Choi was asked where his office was located. He said that he had a primary office at Gimpo Airport and another one in Sejong. Asked how much time he spent at each of those offices, he said he spent most of his time at Gimpo, but he had to go to Sejong two or three times per month. His trips to Sejong generally lasted one day.

Mr. Choi was asked if he had received training before he started working as a POI and he said yes. Asked how long it lasted, he said the first training lasted 1.5 months. He also did four hours of recurrent simulator training and eight hours of ground training each year. His initial 1.5 months of training included four weeks of ground school and 2.5 weeks of field training that served as on the job training. During that training they went to each carrier and received training on the inspection procedure and process.

Asked whether he oversaw only Asiana or other carriers as well, he said he oversaw Asiana plus two LCCs. Asked whether the second Asiana inspector was also assigned to the two LCC's, he said yes but the other POI had only one LCC and he had two, and they were different carriers.

Mr. Choi was asked about the size of the two LCCs he oversaw. He said Air Pusan had five B737-500s and four Airbus A321s. T-Way had five B737-800s. Asked whether anyone had helped him oversee the two LCCs, he said his oversight of the LCCs included flight checks. Flight checks were performed by him and by other inspectors who were not assigned specifically to that airline. Three checklists were used, one for in-flight inspection, one for RVSM, and one for ETOPS. There were six airworthiness safety inspectors. They dealt with in-flight, RVSM, and ETOPS inspections. There was also another checklist that was just for the POI.

Asked to describe his feelings about how Asiana was operating, he said that during his six months of experience with Asiana, all procedures and systems were established by ICAO standards. The simulator training was done according to the Boeing contractor procedure and OE training exceeded ICAO standard procedures.

Asked to describe his own workload and whether it was reasonable, he said it was about 20% more than he thought he was supposed to handle, so the government planned to hire more POIs. Asked whether there was one area where he spent most of his time, he said he spent most of his time planning for Asiana's SMS system upgrade. In addition, he worked with Asiana to improve the quality of operations.

Asked whether his oversight had had any special emphasis areas in the last 6 months, he said they systematically checked that safety issues were being addressed. In addition he focused on the SMS system at Asiana to make it safer. It took money and time.

Mr. Choi was asked what company manuals or sections he would have to approve. He said he had to sign and approve the FOM special limitations and the whole training manual.

Asked whether he had sat in on ground school for B777, he said yes. Asked how recently he did so, he said in April 2013. Asked whether he had sat through the whole ground school, he said not yet. Asked whether he had sat through initial or recurrent CRM training, he said no. Asked whether he had watched simulator training on the B777 he said yes. Asked whether he had observed OE flights from the jumpseat, he said yes, but not intentionally. He might have happened to see it, and he had seen it at KAL, but not at Asiana. Asked whether he had done any enroute inspections on Asiana flights, he said yes. He could not recall the exact number, but he thought perhaps five times. Asked if he could recall the last time he did an enroute inspection, he said in June 2013. Asked where the flight went, he said it went to a nearby destination that was located in China, perhaps Qingdao.

Mr. Choi was asked if he had received any written concerns about safety issues from Asiana pilots or instructors. He said no.

Asked whether he monitored the pass/fail ratio for Asiana pilots during proficiency checks, he said yes. Asked what it was, he said about 10 years ago the fail rate was almost 3.5%, but it was currently below 2%. Asked if he had done anything to make checkride profiles less predictable, he said no.

Mr. Choi was asked when was the last time that he asked Asiana to change operational, training, or checking procedures. He said he had not done that yet. He subsequently clarified that he had suggested that training profiles include crosswinds as high as 30 knots because, depending on type of aircraft, the airline had crosswind limitations that high, and in the training process students only encountered crosswinds as high as 20 or 15 knots. He had suggested that change around May, but it had not yet been executed yet.

Asked whether, since the accident, he had requested any changes in the airline's operational procedures, he said he had been at the accident site, stayed for 10 days, and then came back. He had done a lot of things. Also Asiana was undergoing an audit and it was a very complicated situation. When everything settled down, he would go back to his normal duty and make sure that the operational procedures would be corrected and changed. The inspection audit was currently in progress. It had begun July 22, 2013, and would be completed August 9, 2013.

Asked whether he had meetings with Asiana, he said yes. Because there was a special audit, he had a meeting with designees. Asked whether he had regular meetings with them as POI, he said yes. Asked what the meetings were called, he said they did not have a name. Asked to clarify whether he had normal regular meetings with his counterparts at Asiana, he said no, but there were four areas that were overseen. They included training, quality, examination, and safety management. He had contacts in each of these areas and he could meet with them any time he wanted. In February 2013, Asiana had a special meeting with the government for one month to enhance the airline's safety management program. They were executing that enhanced program at the present time.

Mr. Choi was asked how Asiana pilots were taught about the AT, whether they learned about it in ground school or in the simulator. He said they learned about it in ground school first, then in a fixed based simulator, and then in full flight simulator training. All of it had to be practiced and familiarized. The standard required 120 hours of training, but Asiana provided 168 hours. They trained 48 hours more than required.

Mr. Choi was asked if a controller gave a speed restriction during a charted visual approach to SFO, would the pilot be uncomfortable with the situation. Mr. Choi stated that this was his personal opinion. He said that he had 15 years of military background and 16 years with large aircraft. He recalled making approaches to SFO. He had a number of experiences approaching localizer directional aid (LDA) in the process of approach setup and he thought it was a little more difficult than other airports. The ICAO standard was to make airports safer. However, FAA was advanced in the ICAO standard. Pilots flew with the autopilot system when they approached SFO. It was a little bit uncomfortable to fly manually.

Asked whether there was anything he had not been asked that he thought would be useful for the investigation, Mr. Choi stated that the accident at SFO was very unfortunate, but the Korean government would look for any shortcomings in training, so they had dispatched a 25-member special investigation team to examine, investigate and research the accident.

The interview concluded at 1653.

**Interview:** Eugene Francis Arnold, FAA Flight Test Pilot  
**Representative:** Andy Dilk, FAA Attorney  
**Date/Time:** September 12, 2013, 1300 EDT  
**Location:** Telephone Interview  
**Present:** William Bramble (NTSB), Roger Cox (NTSB), Linda Orlady (Boeing)  
Dan McLucas (FAA), Cho Yong Sun (Asiana Airlines), Tony James  
(FAA), Alice Park (NTSB)

During the interview, Mr. Arnold stated the following.

He was 66 years old. He was a flight test pilot for the FAA Aircraft Certification Office in Seattle, WA. He had been working for the FAA since September 1996.

When asked to describe his career prior to joining the FAA, he said that he had joined the US Air Force in January 1970. He attended pilot training at Del Rio, Texas from June 1970 to June 1971. After that he flew T-38s and F-4s at Homestead Air Force Base. From 1975 to 1976 he flew F-4s in Osan, Korea. After that he was stationed at Langley Air Force Base, where he flew T-39s and F-15s until May 1980. He attended Air Force Test Pilot School from June 1980 to June 1981. He was then stationed at Edwards Air Force Base for 3 years, where he flew F4s, T-38s, and F-15s. After that, he spent 5 years at Eglin AFB where he participated in AMRAAM air-to-air missile testing. He subsequently moved to Seattle, Washington, where he participated in AWACS testing from 1990 to 1993. After that he was a contractor for 3 years, then an instructor for the national test pilot school in Mojave, California. In the mid-1990s he worked for Rockwell on JPAT-related projects. He then spent some time in Korea working on the KTX-1 with the Korean Air Force.

Since he joined the FAA in 1996, he had primarily been flying transport category airplanes. He had flown all the Boeing airplanes from B737 to B787. He had also flown all the Airbus airplanes, including the A380, providing validation testing. In addition, he had flown the Embraer 170 and Dassault 9000 and F7X. Mr. Arnold was still an active pilot. Until recently, had been the primary project pilot on the B787 program. He was still doing some follow-on work with the B787. In addition, he was working on the B747-800 program and he was the primary project pilot on the A350.

Mr. Arnold estimated that his total flight experience was at least 8,000-9,000 hours, with substantial amounts of flight experience in the B737, B747 and B777. He had been the lead project pilot on the B757-300, B777-300ER, increased gross weight B747, and B787. He had type ratings in all the Boeing jet airplanes except the B727, and all the Airbus fly-by-wire airplanes, the EMB-170, EMB-190, the Falcon F-7X, and the T-39.

Asked about his academic background, he said that he had completed a double major in math and physics 1970. He had completed a master's degree in information systems technology in 1979 and he had completed one year of test pilot school. In addition, he received continual training in various aviation subjects through conferences.

Asked for details on other FAA projects he had worked, he said that he had worked on the development of ADS-B, controller-pilot data link communications, HUD testing and other sorts of aircraft systems. Until the time that the Gulfstream G650 was certified, he was the only FAA pilot that had done flight testing on all civilian fly-by-wire airplanes and he doubted that any other FAA test pilot had more experience on fly-by-wire airplanes.

Asked to describe his role as the B787 project pilot, Mr. Arnold said the B787 certification program had begun well before first flight. He had been involved in numerous activities centered on discussions of the airplane's design, new features, potential issues, and the anticipated scope of the test program. He had been involved in initial simulator assessments. Because of the number of new systems on the airplane, the FAA had been particularly interested in systems integration, so he had taken side trips to places like Rockford, Illinois to get his first look at the airplane's electrical system. He had been involved in simulator studies looking at failure conditions on flight deck. If any issues were uncovered, he and his FAA colleagues would get involved in big way. They worked directly with the Boeing flight test and engineering people, and also with FAA engineering departments.

Mr. Arnold was asked to describe his involvement in the flight testing of the B787. He said that the B787 flight test program had involved six test airplanes and 13 FAA flight test pilots. He was the lead test pilot. The FAA tried to participate in as much certification testing as possible. They were involved in pretty much everything, including performance testing, system tests, handling tests, failure conditions, and stall testing. He had personally accrued about 500 hours on the B787 during the test program. They were flying 6 days a week during the program. It was intensive flying that commonly involved 6 or 7 takeoffs per mission.

Mr. Arnold had been assigned to the B787 program from 2003 to 2013. He had been the primary pilot for the A380 and Dassault F-3X during the lead up to the B787 test program. 2009 was the last year he did work on the Dassault program before he terminated his foreign activities and focused on the B787. He had been dedicated to the B787 program from June 2009 to 2012.

Asked how his involvement on the B787 test program had compared to his involvement on the B777-300ER test program, he said that the B787 test program was more involved and more intense because the B777-300ER had been a derivative of a previously certified airplane but the B787 was completely new. The B777-300ER program had not been as in-depth. He had done a lot of flying on the B777-300ER, but the intensity and involvement had not been as high because a lot of the systems on the B777 were already reasonably mature. There had not been as many significant systems-related issues on the B777-300ER as there had been on the B787 with its new technologies. The B787 program had required a lot more attention to detail.

Asked what years he had been involved in the B777-300ER flight testing, he said approximately 2003-2004.

Mr. Arnold was asked to describe the circumstances related to the generation of FAA Flight Test Response Item Report Number 12 during the B787 flight test program. He said Response Item 12 was generated as a result of a test flight that took place on August 30, 2010. The purpose of that test flight was to examine the airplane's performance with artificial ice shapes affixed to the

leading edge of the wings and horizontal stabilizer. They were performing stalls to examine handling characteristics with simulated icing. Near the end of the flight, they were flying north toward Boeing field and setting up for a visual approach to Runway 13. Mr. Arnold was flying the airplane from the left seat. Mr. Arnold selected flight level change speed (FLCH SPD) for a descent from 9 or 10,000 feet down to 3,000 feet. It was a reasonably nice day with extensive traffic in the area. During the descent, the flightcrew received a TCAS RA. Mr. Arnold interrupted their descent to respond to the RA. As he leveled off, airspeed started to decrease considerably, below the maneuvering speed. Mr. Arnold pushed up the throttle levers to prevent speed from decreasing much further. He recovered the airspeed and made an uneventful landing.

As a result of this event, he had conversations with Boeing about the autothrottle (AT) functioning and wakeup logic. Boeing advised the FAA that the AT logic was very similar to the logic on the B777, B767, and B747 airplanes. Mr. Arnold felt that even though the system had been certified previously and had met the requirements of FARs, it was a less than desirable feature and it could be improved upon, so he wrote Response Item 12. The title of the response item was “Autothrottle does not wake up when in Thrust Hold mode.” The description was “When in a descent such as FLCH with autothrottle in THR HOLD mode, and the descent has to be manually interrupted for something such as traffic alert, the autothrottle will stay in THR HOLD mode and will not wake up when it does when you capture the original altitude. The speed will decrease well past maneuvering speed.” He had classified the response item report as a “certification issue.”

Mr. Arnold stated that during the B787 program, if the FAA test pilots came upon an issue that merited additional attention, they would generate a response item, such as Response Item 12. The protocol was to allow Boeing to respond by describing what was being done and how the response item was being addressed. How the response item was addressed typically depended on how much concern FAA had about the feature. There were a lot of factors in play as to whether any modifications would be made to a design as a result of issues identified by the FAA. Such issues received scrutiny from a number of people on the FAA and Boeing sides.

Asked how the response item was tracked, Mr. Arnold said discussions between FAA and Boeing the issue were conducted mostly by email. Boeing’s position was that the feature had been certified on previous airplanes, it was a proven issue, and there had been no issues with it during in-service operations. They felt it met the requirements for what was intended for the system and it met the FAR requirements.

When the FAA did any certification program, it shared information with foreign regulators. They briefed foreign regulators prior to their validation flights and vice versa. Both FAA and EASA had commented that the AT function in FLCH was a less-than-desirable feature that could be improved upon. EASA had written the following in a finding titled “Major Recommendation for Improvement #3”:

The autothrottle wakeup feature has been considered by the certification team as a system improving significantly the safety of the aircraft to be certified. It protects the aircraft not only against stall but also against low energy states, anticipating on the stick shaker triggering. Unfortunately there are on the B787 (as well as some other previous Boeing



models) at least two automation modes (FLCH in descent and VNAV speed in descent, with ATHR on HOLD) for which the autothrottle wakeup function is not operative and therefore does not protect the aircraft. Although the certification team accepts that this autothrottle wakeup feature is not required per certification requirements, these two exceptions look from a pilot's perspective as an inconsistency in the automation behavior of the airplane. Inconsistency in automation behavior has been in the past a strong contributor to aviation accidents. The manufacturer would enhance the safety of the product by avoiding exceptions in the autothrottle wakeup mode condition.

There had been a lot of development issues with the 787 program. Some that had been very significant had received a lot more attention and Mr. Arnold thought that was appropriate. Mr. Arnold felt that the possible design change he had suggested in Response Item 12 was a "nice to have", not a "have to have" item. The FAA was not going to say Boeing had to change the design because the FAA did not think there was a significant safety concern. The FAA had participated in hundreds of stalls during the B787 and B777 flight test programs. They were familiar with pre-stall alerts that were provided and the pre-stall and stall characteristics of the airplanes. They felt that the alerts that were provided were adequate to allow a pilot to deal with a stall under normal flight conditions, so the FAA had not considered Response Item 12 to be a must-change issue. No one had envisioned an approach stall at very low altitude. Stall testing had been conducted as low as 3,000 to 4000 feet above the ground, but not as close to the ground as Asiana Flight 214 was.

Although Mr. Arnold felt a design change was only "nice to have", he thought some information about this functionality should be provided to flightcrews. As a result, the FAA required Boeing to make an entry to the B787 Airplane Flight Manual (AFM) which stated, "During a descent in FLCH mode or VNAV SPD mode, the AT may activate in HOLD mode. When in HOLD mode, the AT will not wake up even during large deviations from target speed and does not support stall protection." This note was placed in the AFM in August 2011.

Mr. Arnold said there had been another, shorter note in the B777 FCOM and also in the B787 Flight Crew Operating Manual (FCOM) stating: "During descent in VNAV SPD, the AT may activate in HOLD mode and does not support stall protection." He stated, however that the longer note that was inserted into the B787 AFM was not contained in any other Boeing AFMs, and it did not find its way into the B787 FCOM or any other Boeing FCOM either. Asked to confirm that the longer note referencing FLCH was not included in the B777 FCOM, he said that was correct. The AFM was certified by the authority of the FAA and included 100% of the airplane limitations and certain other things.

Mr. Arnold stated that the FAA did not have direct control over the FCOM. It was not approved by the FAA as part of the certification process. Many elements of the AFM found their way into the FCOM, but the FAA did not have direct control over the FCOM. It was the responsibility of the manufacturer to oversee the development of the FCOM. Airlines would use the manufacturer's version of the FCOM or modify it to conform to their operation. Airlines could elect to go ahead and put the AFM note in their FCOMs, but he doubted that a lot of airlines had done so.

Asked to specify which note an airline could choose to include in the FCOM, he said he was referring to the note which stated “During a descent in FLCH mode or VNAV SPD mode, the AT may activate in HOLD mode. When in HOLD mode, the AT will not wake up even during large deviations from target speed and does not support stall protection.” The existing note in Boeing’s version of the FCOM was “During descent in VNAV SPD, the AT may activate in HOLD mode and does not support stall protection.” Boeing had originally proposed adding “FLCH” into the existing FCOM note as a solution to Response Item 12, but Mr. Arnold had insisted that the longer note be inserted in the AFM instead.

Mr. Arnold was asked who came up with the wording of the sentence that was inserted into the B787 AFM. He said Boeing and the FAA “went back and forth” over the wording. Mr. Arnold wanted it to convey the information that the airplane could experience large deviations in speed and the AT would not wake up. He said he thought that the verbiage of the sentence that was eventually inserted into the AFM did that, and Boeing had accepted it. Asked whether the issue he had raised in Response Item 12 was resolved to his satisfaction as a result of this change, Mr. Arnold said that it would have been desired to also put that statement in the FCOM, but Boeing did not do so.

Mr. Arnold was asked why he had initially considered this feature of the AT to be a safety issue. He said he identified it as a safety issue because during the August 30, 2010, flight he had experienced a significant airspeed deviation while dealing with a TCAS alert. He had subconsciously expected the AT to wake up sometime during the level-off and it never did and he had to go ahead and take over. He felt that this was a less-than-desirable feature but not a significant safety issue. He felt it could be improved upon. Asked how far the airspeed had deviated below the target speed before he noticed it, he said 10 or 15 knots. After that, he watched to see what would happen. He said he did not feel uncomfortable watching it, but he was not going to let it get to stick shaker. He acted when the airspeed got down toward the amber band. At that time he manually pushed the thrust levers forward and decided to discuss the issue with Boeing after landing.

He had about 500 hours on the B777 at the time of the August 30, 2010, incident. Asked if he had ever observed this behavior in the AT before, he said no, nothing had come up that had drawn his attention to it. Asked how commonly he felt a line pilot would encounter this functionality, he said the only time would be if they were to deviate from normal flying tasks, most significantly an interruption of a descent due to a TCAS alert or an intermediate level-off. In most cases, if asked to level off, a flightcrew would dial the MCP to the new altitude and leave that new number as the target altitude, or they might select altitude hold. Either choice would cause the AT to transition from HOLD to SPD mode at the target altitude.

Mr. Arnold was asked to explain what was meant by stall protection in the note inserted into the AFM that read “During a descent in FLCH mode or VNAV SPD mode, the AT may activate in HOLD mode. When in HOLD mode, the AT will not wake up even during large deviations from target speed and does not support stall protection.” He said it meant the flightcrew would not get AT wakeup. Other protections, such as the airspeed low caution alert and the stick shaker, were still available and active. Asked whether low speed protection would cause the AT to wake up, he said the AT would only wake up for low speed protection if the AT switch was armed and the

AT button was selected to “off.” There were certain pages in FCOM that spoke to that to some degree. It also specified that it would not occur below 400 feet on takeoff or below 100 feet on approach.

Mr. Arnold was asked who at Boeing he interacted with directly on the issue identified in Response Item 12. He said that the FAA test pilots interfaced with the Boeing certification office and the Boeing flight test office. When the FAA pilots had specific issues, they would channel them through the Boeing flight test office. The Boeing flight test office would then task Boeing personnel for a particular issue. For Response Item 12, those personnel were in Boeing’s autoflight office. Asked who those individuals were, he declined to provide specific names, stating only that they were professional colleagues.

Mr. Arnold stated the feature he had identified was just one feature of a very complex AT system. Various forms of low speed protection were provided for the B787 and B777, and there were different triggers depending on whether the AT was engaged or whether the throttles were being manually operated and whether the flight director was enabled or not. There were lots of different variations in terms of how the protection features functioned.

Mr. Arnold was asked to clarify the safety implications of this particular design feature, and he said that the safety issue was that the AT system did not function the way he had expected or assumed it would operate. He thought that if it had caught him by surprise, he thought that a line crew would have same uncertainty about how the system might function. He felt it would be nicer if the system functioned in a more expected manner and woke up in FLCH if a large deviation in airspeed occurred. Furthermore, he felt that if this aspect of the design was not changed, it would be nice if flightcrews were made aware of this particular feature.

Mr. Arnold stated that during certification of many features, it was common to have to determine whether it was necessary to modify a system or make sure crews were aware of how it functioned. This particular issue was significant enough that both he and the European flight test personnel had agreed that Boeing should consider enhancement to the system. Asked whether this meant that a design change was being sought in future airplane types, he said that EASA had written that, “The manufacturer would enhance the safety of the product by avoiding exceptions in the ‘Autothrottle wake up’ mode condition.” For his part, Mr. Arnold said he had written emails to working-level people at Boeing saying that he believed the system design was not as robust as it could be and pressing for system design enhancements sometime in the future. He stated, however, that these emails did not carry the same gravity as a formal signed letter from FAA’s upper management. He said that he did not feel this particular issue was significant enough to push it to that level.

Mr. Arnold confirmed that the note he wrote was in the B787 AFM but not in the B787 FCOM.

Referring to his B787 test flight on August 30, 2010, he stated he was manually flying the airplane in a descent and he pulled back on the control column to interrupt the descent. The airplane was in throttle hold mode and he made no commands to the autoflight system when he leveled off. He did not remember if the autopilot had been on prior to the RA, but he thought he definitely would have taken the airplane off autopilot to respond to the RA.

Mr. Arnold was asked why the B777 autotrim system did not trim for speed (as the Airbus does) even though it automatically trimmed for other things, such as changing flap position. He stated that in designing the B777, the company wanted to make the airplane as similar to a classic airplane as possible. If one deviated from speed, speed stability would cause a force buildup, and if one deviated in rudder, the rudder would pick up. The Airbus had neutral speed stability until lowest selectable speed (VLS). In the B777 fly by wire system, pressing the trim switch did not move the horizontal stabilizer. Rather, it reset the speed in the FLCC to a new neutral point. If the airplane got excessively slow, such as below the min maneuvering speed or in the amber band, the trim could not be reset to a speed slower than the maneuvering speed. The pilot should get the same cues from the B777 as a classic airplane for speed, but the airplane eliminated some undesirable features, such as continued trimming into a low speed condition.

Mr. Arnold was asked if Boeing's design intention was for the pilot to be in the loop and sense, from pressure on yoke, whether the airplane in trim or not. He said yes, that was the intent. A pilot would have a lot of the same natural cues as they would get when flying a classic airplane. The force was about 1 lb. per 6-knot change in airspeed. Asked whether he would expect a pilot to be trained to recognize when the airplane was out of trim based on the force feel, he said a pilot should be able to tell that the airplane was out of trim and have the desire to put it back into trim. It was possible to fly the airplane out of trim, but the natural tendency was to trim the airplane and, on approach, to trim it to the approach speed. If the airplane deviated from the trim speed the pilot would have some cue that speed deviation was occurring because of that speed stability.

Mr. Arnold was asked if it was an intentional design feature of the B777 to have no speed protection when in FLCH or VNAV SPD and thrust mode HOLD. He stated he had no idea, he did not know why it was there. Investigators would have to ask Boeing about that. There were times when the AT was in HOLD and one would not want it to wake up. During TO (takeoff) thrust, the autothrottle would go into HOLD at 65 knots. If the AT was not in HOLD, it would fight against you if you wanted to pull it back, as during a rejected takeoff. There were other times when a pilot might want it in HOLD as well. Investigators would need to get details from Boeing specialists.

Mr. Arnold was asked about the EASA statement pertaining to the FLCH/AT HOLD issue during B787 certification. He said there were different levels of issues. Some levels were required for certification and had to be fixed, while other levels were just recommendations. The EASA statement, "EASA major recommendation for improvement #3" was just a recommendation, it was not a requirement. He thought Boeing would be able to provide a copy of the EASA recommendation.

Referring again to the descent that occurred during his test flight on August 30, 2010, he said he could not remember the autopilot engagement status for certain, but once he received the TCAS RA his response was probably to turn off the AP and AT and decrease the rate of descent. He had flown with the AP or the AT disengaged at times during the test program and it was common to land with the AP disengaged and the AT engaged. On the B777 it was even possible to operate the airplane with the AT engaged on a single engine, if needed. The normal training was to fly

the B777 below 1000 feet with the AP disengaged and the AT engaged. Regarding the event he had referred to earlier, he said he had been expecting the AT to wake up at some point and it did not. That was the reason for his question to Boeing.

Mr. Arnold was asked if during the stall examination for the 777 stall protection limit, trim was limited in the nose up direction. He stated yes, once you got into the amber band, longitudinal trim would no longer trim to a slower speed. He was asked if he thought that was effective for stall protection. He said yes, one would not want the airplane to trim to slower speeds. Both Boeing and Airbus would stop the stabilator from trimming to slower speeds. If you trimmed the stabilator too far into slower speeds, you might not be able to recover from a stall. It was important to keep the trim above a certain speed. As an example of why this is a problem, he said that during the AF447 accident, the pilot was able to trim the stab to an extreme position. The logic of the Boeing system was to stop the trim before the trim speed went below maneuvering speed.

The date of his test flight incident was 8/30/2010 and the aircraft was ZA5.

The formal process for EASA or FAA to elevate something to more than the informal emails back and forth was to identify an issue and establish a response item process. A low level issue could be handled at the working level. If there were more significant issues that needed to be formally addressed and documented, they would generate a formal letter from FAA to Boeing management. There were a number of issues on the 787 program where that had occurred. EASA had done a validation test activity that included two visits for the B787, one early in the program and one late. That report EASA generated was a formal report presented to Boeing flight test. It should be in Boeing's records. Daily emails were normally exchanged between him and Boeing personnel. He had primarily interacted with Boeing pilots and engineers on the FLCH issue described in Response Item 12. The support the FAA had received during the B787 program had been superb, and the Boeing people had been very professional and straightforward. Boeing had provided them information and helped them resolve issues.

Approximately 60 to 70 response items had been generated by FAA flight test during the B787 certification program. If he felt it was something significant they went the letter route. He thought six or seven letters had originated from his office. Other disciplines such as propulsion and avionics might have written additional letters, but flight test had more opportunity to directly observe the behavior of the new airplane. In addition to response items and letters, issue papers were generated for new or unique system features and for which there may or may not have been a specific regulatory requirement. FAA would generate an issue paper to better define requirement for a new system for which there were no current regulations.

Asked if EASA delegated the resolution of the FLCH issue to FAA, he said it was a recommendation, not a requirement. If it was considered a certification issue that was required to be fixed, there could have been derogation. A certain time frame would be needed for a correction, but this item was a recommendation with no requirement.

Mr. Arnold had about 1,000 hours in Boeing airplanes at the time of the incident, and his experience included the B737, B757-300, B777-200ER, and B747-400.

Asked whether he dealt with any human factors specialists when resolving Response Item 12 or other issues on the flight test program, he said there were a lot of human factors specialists involved in the B787 program. The B777 was designed so that avionics functions were tied to single line replaceable units (LRUs), similar to the EMB 170 and 190. With the B787's integrated avionics, there was potential for systems failures to have dramatic process failure effects on other systems. Because of that, FAA had generated specific issue papers on flight deck failure modes and effects. The simulator program had looked at 4 or 5 such failures and effects and they flew 7 in flight.

Significant failures they had tested included loss of airspeed and loss of other key avionics. On one flight they simulated dual engine failure, and they shut down hydraulic and electric power. Throughout all this testing, they had transport directorate human factors people sitting in on flight test panel meetings. The meetings were normally a joint exercise. There were not only FAA flight test people and systems engineers, but also EASA reps and Canadian TSB reps. The EASA pilots came in late in the process and they pushed hard for a strong human factors focus. They generated a certification review item (like the FAA's issue papers), looking at issues they wanted to focus on and how they would be evaluated. EASA already had cert standard 25-1302 in place, a requirement the FAA later put in place as well. This standard required human factors assessments and a system had to be designed to the requirements of that particular rule.

The FAA flight test branch had a human factors specialist. That specialist was involved in flying all of the failure condition flights and some of the simulator work. Some of the failure cases they tested were extreme, including blocked static ports and iced pitot tubes. During those and other cases they had human factors specialists looking over their shoulder. If they came across something interesting that was related to a failure presentation, they got other crews involved. In addition, they had both a certification pilot and an operational pilot from the Seattle ACO involved in the simulator tests, and those were the FAA pilots who also dealt with the training for B787 aircrews, simulator programs, MMEL lists, and the flight standards review board. The FAA worked hard to integrate FAA human factors and systems people into the certification process.

Asked if any human factors people were involved in reviewing response item 12, he said he did not think they were. It was not one of the things where he brought it to their attention and said they needed to be aware of it. It was not one of those things where they would convene a meeting with folks from the various disciplines. Other issues were significant enough that they brought in the FAA human factors folks. This was not.

He was able to put a note in the B787 AFM, but could not put the same note in the B777 AFM even though the subject of the note was similar in both airplanes. Their responsibility was to certify the B787 and that airplane's AFM was part of that process. The B777 AFM was already approved and in place. FAA did not have control over the FCOMs. The manufacturer generated those. He did not follow the issue through to the B777. The FLCH issue was a concern he felt needed to be communicated out, but he did not think it was so serious that he could force modifications to something that was already approved.

Mr. Arnold was asked if he knew of any current plans the FAA might have to ask for modification to the B777 AFM. He said he expected that, because of the Asiana accident, the FLCH system feature would be a focus of their attention. He had informed his management that Response Item 12 existed and that it was relevant to the Asiana accident. He was sure there would be some attention to how it needed to be addressed. It could be addressed through an airworthiness directive, but even after this accident, he did not think that was warranted. Awareness of the feature should be the initial stage, and a design change should find its way into future designs.

Asked if there was anything not asked that he wanted to discuss, he stated low speed awareness. A report on low speed awareness had been generated a couple of years ago. There had been a good discussion on low speed awareness and recommendations to go along with it. He had passed that information along to FAA AVP100 and he thought it was relevant to this accident. The Asiana accident was very similar to a couple other accidents, including an A320 accident involving Indian airlines on February 14, 1990. They got in a situation where they were in idle power and open descent mode on approach, similar to FLCH mode. The pilots did not recognize the situation until way too late and crashed short of the runway. Another related accident was the Turkish airlines accident in Amsterdam. The flight was in a high energy state initially, but the crew allowed the airplane to slow. The Indian Airlines accident was in Bangalore. The FAA "lessons learned" web site was available to anybody who wanted to look at it. Flight Safety Foundation (FSF) generated a number of bulletins regarding various issues involving approach accidents, and focused on automation, stabilized approaches and CRM. Those bulletins were forwarded on to AVP100 as well. FSF published an article on the Bangalore accident back in 1994. In the Turkish Airlines accident there was a human factors report put out regarding aircrew interface. In his mind it was an excellent report.

Asked if there was anyone else with whom investigators should speak regarding this particular issue or the accident investigation, he said not regarding the Response Item 12 issue. For understanding of AT and AF systems he suggested talking to Boeing. Joe Jacobsen of the transport directorate had been involved in the low speed awareness working group. Asked whether that effort had been part of the CAST JSAT/JSIT project on airplane state awareness he said he did not know.

Asked whether he thought the solution to pilot mode confusion involving AT wakeup in FLCH was to remind and train pilots to monitor better, he said it was important to remind and train pilots to monitor. Airbus said to verbally read out the mode for any FMA change and it was something he had a habit of doing with the Airbus. Potential mode confusion had always been a concern. The Turkish Airlines human factors report addressed a lot of concerns about automation and mode awareness.

**Interview:** Victor Jerome Hooper  
**Represented by:** not represented  
**Date/Time:** September 19, 2013, 0900 EDT  
**Location:** via teleconference  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; Cho Yong Sun- Asiana Airlines; Alice Park-NTSB (interpreter)

During the interview, Captain Hooper stated the following:

He was 64 years of age and was currently retired. His most recent employment was as a B777 captain at Asiana Airlines, where he flew from December 2005 to September 2011. He logged approximately 3,000 hours in the B777 while at Asiana. His last previous employment was at Delta Airlines, where he was employed for 28 years and retired in 2005. He logged approximately 800 hours in the B777 at Delta. He had also flown the B767-400, B767ER, L1011 and the B727 and logged a total of 20,000 hours at Delta. He had also served as vice commander of an airlift wing and as a C-5 squadron commander and logged about 6,000 hours in the U.S. Air Force. He flew as a line captain at Asiana and did not hold any other title or position there.

He was asked how visual approaches were conducted at Asiana. He stated that pilots were seldom allowed to practice visual or contact approaches and every time he offered an FO such an approach, they would refuse or be highly resistant to the suggestion because they did not feel comfortable with it and did not have experience doing it in a B777 or other big airplane. He thought they did not feel confident and did not want to make any mistakes. Pilots did not want to do visual approaches and acted as if they never did them, other than once a year in the simulator. Asked to provide specific examples where this took place, he stated New York, San Francisco and Seattle stood out, and Seattle in particular was prominent in his mind because of the difficulty of visualizing an opposite direction approach. Almost all the time crews preferred to fly a coupled ILS down to 1,000 feet above the ground.

As an example, during an descent and approach to Los Angeles flown by the FO and arriving from over Malibu and Santa Monica and blending with traffic coming straight in from the east to runway 25L, Captain Hooper suggested they could get in quicker if they asked for a visual approach. He asked the FO "is that okay with you" and the FO said he would rather not; he didn't have to do that. Captain Hooper said he would talk the FO through the approach. The FO had a great deal of difficulty visualizing what was necessary to intercept the glideslope from above because they almost always fly large patterns where you intercept the glide slope from below. The FO lacked the experience to deal with that. When the FO turned a 10 mile base over the LA River they were high and the FO leveled off rather than continue the descent. Captain Hooper took over control, descended and established the airplane on the glide slope. Once they were on the glide slope with cross hairs centered there was no further problem, but absent that guidance there was some difficulty and resistance to doing it. That example stood out in his mind.



Captain Hooper was asked to provide an example of a visual approach flown to San Francisco. He stated Asiana stressed very controlled environments and was very critical of excessive descent rates. He observed that FO's would want to slow down way early, which did not fit in when you were coming in from the north over Point Reyes and had to turn 90 degrees to the runway in the descent. That was a very uncomfortable situation for a lot of their pilots, because they usually operated in a large scripted pattern. Having to compensate for coming in over the mountains, having a fast descent rate and slowing down was not something they got a lot of practice with. He had guys who had a lot of problems with that, even with glideslope available, because they really wanted to fly an ILS and then couple the ILS to the AP (autopilot).

Captain Hooper was asked if he had any experience with visual approaches to runways 28L or 28R in SFO where the crew was not able to perform the approach visually. He stated he had an FO say "captain, you are more experienced at this, I think you should fly" because the approach was not a standard ILS with a long final approach.

Asked if there was anything about the company's training that did not prepare Asiana pilots to feel comfortable flying a visual approach, he stated all the Asiana pilots he flew with were extremely competent at executing the training they were provided, but there was minimal training in how to do a visual approach. They got one approach a year in the simulator. Particularly for FO's, they were going to be captains and should be getting that experience that their judgment was going to be based on, but it was just nonexistent. They did a circling approach to Bussan in the simulator every year because of the accident they had there. Even then, the way Asiana and the Boeing training system worked, they were so tied in to making the automation match the visual, setting the descent rate on FD (flight director) to match what they were going to do, that they didn't have the opportunity to practice the basic stick and rudder skills. He was sure that, given the opportunity, they would be excellent pilots, but that was the way they learned it. The typical normal flight was almost always done the same way. If you stepped outside the paradigm, that's where the difficulties came in.

Captain Hooper was asked if any aspects of training in the simulator were missing, and if any aspects of the training could be improved to address visual landings. He stated they really needed to add in the syllabus more visual approaches where they just go down and fly around a local area and fly without autothrottles, because they count on the autothrottles and assume they're going to work right. That might improve the crosscheck. They should practice VFR patterns.

One simulator training event they did was a terrain avoidance maneuver on a departure from SFO where they broke out between the hills. They needed more like that, hand flying the airplane and not using the autopilot. They used the autopilot, setting and flying radials, for the engine out event when flying between the hills, but they needed to hand fly that.

He was asked to discuss the ability of airline pilots to maintain proficiency in manual flying. He stated that in his opinion many pilots had become a contingent of very bright computer programmers because of doing very little hand flying. For example, the typical crew of an Asiana B777 would go gear up, AP on. There was a policy in the FOM (flight operations manual) where you had to have the AP on above 5,000 feet, even on beautiful clear day. Then the AP stayed on until the airplane was configured with gear down at 500 feet. If you didn't

practice you lost your basic skills. A lot of pilots never got the experience to get the judgment to do the hand flying.

Asked if he made any suggestions to the company management to improve training, he stated he had offered to help rework manuals, had offered suggestions about taxiing in low visibility, and had offered to be a flight instructor, but nothing came of it.

Asked if he had any conflicts with the company management that resulted in any disciplinary action against him, he said no. He met the senior vice president of operations, who was very amicable, and he met several chief pilots, all of whom were as nice as they could be. He did not think there was a lot of power in the chief pilot's office. Most operations policies came from above. The chief pilots were a great group of people and the only ones he dealt with. Asked if the company had any issues with his performance when he left the company in September 2011, he said no, his reasons for leaving 3 months earlier than planned were based on personal considerations.

He was asked if the check rides at Asiana were adequate considering that they were described to be highly scripted. He stated the pilots had a great intelligence network, had their own web site and passed information around. Every FO knew about every captain, including how he liked his coffee. Korean pilots were very smart and diligent within what they were allowed to do. He always knew exactly what was going to be on flight checks. He heard comments from instructors that if they changed the profile and inserted a hydraulic or electrical problem, the pilots would get the scripted problems right, but weren't prepared for the unexpected. When he had a check ride at Delta, or an Air Force check ride, he would never have any idea what was going to happen. He had to study for everything at Delta and didn't know what was going to happen next, but he always knew what was coming at Asiana.

He was asked if he saw any tendency among pilots not to put their hands on the throttles or not to feel throttles moving. He stated he would see them put their hand on the throttles and they were very observant of them in cruise. Often they would pull the throttles all the way back if they got close to an overspeed. During landings he saw hands on the throttles, but it was almost a subconscious thing, like part of the checklist. It didn't mean they were following what the throttle and airspeed were supposed to be.

When asked about his experience hand flying airplanes at Delta, he stated he had flown out of the New Orleans base on the B727 as an FO and commonly hand flew every other leg. The flights were short and the AP was basic, so he would hand fly to altitude and back down.

Asked if he was encouraged to do much visual flying on his initial OE (operating experience) at Asiana, he stated he flew no visual approaches during that time. The line training consisted mostly of orientation to each of Asiana's sectors, Oceania, North America, Europe, and Japan. He did not request a visual approach because he was trying to see how Asiana performed their business and he needed to follow their procedures and not what he brought from Delta. There was never a visual approach on OE, but he did manually fly the airplane and was told he should put it on autopilot.

He was asked about further details of the approach to Los Angeles he described earlier and if he gave the airplane back to the FO during the approach. He stated he descended to the glideslope, put the gear down for extra drag, configured the airplane, and then the FO flew it. The FO hand flew the airplane on the crosshairs and landed fine. It was like he had been lost. He wasn't sure what he was supposed to do to get where he needed to be. They discussed the approach on the ground afterward and the FO said he didn't need to know this, but he was very gracious.

Captain Hooper had never had to write up an FO for unacceptable performance. Everyone he flew with performed based on what their training presented. Often the younger pilots were not allowed to fly and land. The captain's took more of the landings and the FO's would often have to go to the simulator to maintain landing currency. That was the case on the B777 where there were two crews on flights and there were not enough landings to go around. Crews did not get enough experience with visual flying and manual manipulation of the controls.

He was asked if during the Los Angeles approach, when he requested the visual approach, had he briefed that option or just decided to do it. He stated they did the initial briefing while still at altitude before beginning the descent, about 200 miles out, so he had not briefed the FO on the possibility of accepting a visual approach. He said let's take the opportunity to do the visual and he talked the FO through it.

He was asked if he noticed differences in the way Delta expected pilots to fly the airplane compared to Asiana. He stated there were different expectations of what they would do. A new pilot was expected from the very beginning to fly every other leg and do it all. He did not know what was going on at Delta now with the automation and how much pilots were flying now. He got an experience at Delta that the young guys at Asiana did not get. At Delta everybody was considered pretty much equal, but it was more an equal footing. At Asiana there was a clear line, where the captain was way up on a rung. He thought that the changes that occurred at Korean Air after their problems in the previous decade broke that company away to a western orientation, but that didn't happen at Asiana. When Mr. Greenberg was at Korean Air, he required pilots to speak English in the cockpit. When Asiana pilots were together in the cockpit they spoke Korean, so they only spoke English when there was a westerner present or when they had to talk to ATC, and their English skills were weak.

He was asked in flying the B777, did he ever have an experience where he was in a descent and the speed feature where AT comes up automatically didn't come up the way he expected. He replied that he had such an experience, but it involved a lag of about 10 kts before responding and did not involve a situation where it did not come up at all.

He was asked if there was anything not asked that he thought should be asked, and if he had any additional comments. He stated no. He could have provided more examples of going into airports where conditions were more extreme with visual approaches than he had. He thought the guys at Asiana need more experience.

**Interview:** Kenneth Daryl Musser, Jr.  
**Represented by:** not represented  
**Date/Time:** September 24, 2013, 0900 EDT  
**Location:** via teleconference  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; Cho Yong Sun- Asiana Airlines; Alice Park-NTSB (interpreter)

During the interview, Captain Musser stated the following:

He was 63 years old and currently retired. His last previous employment was as a B777-300ER captain at Turkish Airlines from December 2009 to March 2011. Prior to that he was a B777 captain at Asiana Airlines from January 15, 2006 to October 28, 2009, and prior to that he was a captain at Delta Airlines. He worked at Delta as a pilot from April 1973 to December 31, 2005. While at Delta he logged approximately 1,900 hours on the B777. He also flew the B757/767, B737NG/G, and the B737 classic, the DC9, the MD88, the L1011, the B727 and the CV880. He had logged approximately 24,000 hours total, of which 6,000 hours was as a B777 captain. In his nearly four years at Asiana he logged about 3,800 hours in the B777. He was a line pilot at Asiana and had no other duties there.

While at Delta he had been a B737 aircraft specialist beginning in 1984, and he had also been an accident investigator and a B757/767 aircraft specialist. He was the ALPA<sup>1</sup> central air safety vice chairman at Delta from 1987 to 1992, and chairman from 1992 to 1996. From 1996 to his retirement he was the ALPA international safety chairman. He was an ISASI<sup>2</sup> member and had participated in the Pena zero accidents committee, the ETOPS<sup>3</sup> ARAC<sup>4</sup> working group, and IFALPA<sup>5</sup> forums, and he wrote IFALPA's 1998 policy on sleep and rest facilities. He was involved in the introduction of CIRP<sup>6</sup>, FOQA<sup>7</sup> and ASAP<sup>8</sup> safety programs during his career. He had received no disciplinary action while working at Asiana and left the company at the end of his contract, which coincided with reaching age 60, which was the company's retirement age policy.

Captain Musser was asked what was the willingness and ability of Asiana pilots he flew with to conduct visual approaches. He stated he found it extremely difficult to get an FO to fly a visual approach or even to fly a leg. He would ask them to fly and they would say it was his decision. He would normally give them the outbound leg, which meant flying to Europe or America, but they were reluctant to fly the leg unless ordered to do so. FO's would politely decline to fly but he would say, no, you need the experience. Although they were reluctant to land if an airport did

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<sup>1</sup> Air line pilots association

<sup>2</sup> International society of air safety investigators

<sup>3</sup> Extended twin engine operations

<sup>4</sup> Advisory and rulemaking committee

<sup>5</sup> International

<sup>6</sup> Critical incident response program

<sup>7</sup> Flight operational quality assurance

<sup>8</sup> Aviation safety action program

not have an ILS, when Musser coached them about being a little too low or too fast they would thank him later and say they learned something.

As an example, Captain Musser cited a trip he flew from Korea to Chicago O'Hare airport (ORD). There were two pilot crews for the flight, and he offered the flight to the Korean captain. When that captain found out during the initial briefing that the ORD arrival runway had a displaced threshold of 3000 to 4000 feet, he did not want to fly the leg. Musser flew the leg and hand flew the airplane during the approach and landing longer than they wanted, and continued to hand fly it to the touchdown point. They were in visual conditions and it worked out fine. He had done this type of flying all his life and it was second nature. Having the automation, the PAPI and the glide slope was nice if you had them, but they were not available on this approach.

Captain Musser stated that Phuket, Thailand (HKT) was an Asiana B777 destination commonly flown to by foreign or expatriate captains because it had an offset localizer which did not permit autoland. Korean captains would typically only be assigned to HKT flights when they ran out of foreign captains.

Captain Musser was asked if he had conducted Asiana flights to San Francisco (SFO). He stated SFO was a special airport and he had to fly a trip to and from there as part of his initial operating experience. The west runways, 28L and 28R, were in use for landing 95% of the time, but on that flight they were unavailable due to winds. Runway 19 was in use, and the check captain said, "Can you do this?" Musser said yes, we will break out at 7,000 feet, you'll see the golden gate on the right. They were a bit high from ATC handling, but he set up the FMS for what he needed to do, clicked off the autopilot (AP) at 5,000 feet, and used the spoilers to get down and stabilized per the FOM. The check pilot in the right seat and the FO in the jump seat expressed amazement, but it was second nature to him. He had a glide slope or PAPI but did not use the automation. The check captain had never seen a runway 19 operation at SFO. Asked whether he considered being a little high to be abnormally difficult, he said no, he was probably 1,000 feet high at 15 or 20 miles out and this was manageable with speedbrakes. He got into a slot about 12 miles out. The check pilot asked if he was capable of completing the approach and he said yes. They completed the approach and landing without difficulty.

Asked if it was acceptable or normal to use speedbrakes with flaps other than zero, he said it was acceptable and it was a procedure to use them to correct the flight condition.

Asked if in his experience visual approaches were part of simulator training, he said yes. The training satisfied a requirement but everybody knew the profile (airport, profile, weather) and could almost do it by mechanically memorizing it. They also trained a certain circling approach to Bussan visually because of an accident in 1993 or 1994.

Asked to what he would attribute the reluctance to fly visual approaches, he stated they only did one visual on a check and then they went back to automation, automation. The training was to fill in the square on the simulator check ride rather than to learn something. If they could do a complete autoflight / autoland system approach they would.

He was asked if he had offered to assist with training or make other inputs to management. He stated, yes, I did, and they didn't want to hear from me. If it wasn't invented by them, they didn't want a foreigner to help them out. They did hire an ex-pat whose first language was English as a ground instructor, but they wouldn't let him be a check airman. As an example of his experience, he stated he went into the chief pilot's office early in his contract and said I'm glad to be here, you probably have my resume, and can I help. The chief pilot said we'll let you know, but the policy was we can do this ourselves. He didn't say no, but his actions spoke loud.

He was asked if QAR exceedences were used to provide feedback to line pilots. He stated he knew there was a QAR program and that the pilots were in fear that it would be used for retribution. Pilots told him they were afraid of the QAR, and if they had two QAR exceedences in their career they would never be allowed to check out as captain. FO's said that was why they always used the autoland and had to be forced to take a leg for practice.

Asked if he could document the two exceedences policy, he stated this was only told to him by the FOs when they felt comfortable with him. He was told that if anybody had an exceedence they were publicly identified, but he never saw it himself. Musser did not have access to the web sites that provided that information and couldn't read them anyway because they were in Korean. Asked if he was aware the current FOM stated the company had a non-punitive policy for safety reporting, he stated he was not aware of that program.

He stated that he had one personal encounter with the use of the QAR. On one flight he was stable and disregarded a false windshear warning on an airplane that had a recurring glitch. It always happened on that airplane, at 500 feet at Tokyo, just before crossing the shoreline. 50% of the time the airplane would produce a false windshear warning in completely clear weather. The pressure hadn't changed more than 1 hectopascal, and there was no convective weather. He briefed if it happened he would say "false warning" and tell him to continue to land. It did happen and the FO wanted to go around and Musser told him to land. However, the FO clicked off the autothrottles and froze. Musser took control and did a manual landing with no autothrottles. The FO wrote up a report and two weeks later the captain received an email that stated he was stabilized, he did everything correctly under existing guidelines and he did a good job. He was never in fear of a QAR report.

Captain Musser was asked if he went through initial qualification training on the B777 when he came to Asiana. He stated they took an initial check as part of the interview, then spent one week at Boeing in Seattle doing a reorientation. When they returned to Korea they had training and took a Korean exam concerned with punishment for doing things wrong. When he went on the line he had to visit each of Asiana's theaters, Oceana (including Australia), Europe (London or Frankfurt), Tokyo, China and Southeast Asia. There were 5 theaters.

He was asked if the B777 system training was good. He stated everyone knew what to expect, each instructor's idiosyncrasies were on a web site, and training was cut and dried. Asked again if the FO's seemed to be well versed in autoflight systems, he stated yes, and they memorized everything. Often it seemed they memorized every word on the page. He thought they understood the systems.

He was asked if he ever recalled flying a long, 12 to 14 mile straight in visual approach in the simulator, similar to what he described when he flew the runway 19 approach to SFO. He stated he recalled doing the circling approach to Bussan in the simulator, but not a straight in like the runway 19 approach. He may have done so when at Delta. Asked again if Asiana visual training was done straight in or from a pattern, he stated they did a 3 mile traffic pattern with a downwind, base and final.

He stated he observed that FO's would do autoland about 50% of the time and the rest of the time they would turn off the autopilot at about 1,000 feet after they were lined up and stabilized.

Captain Musser was asked to discuss his false windshear experience. He stated the FO was the pilot flying (PF) and the FO disconnected the AT rather than push the TOGA button, which was the windshear procedure. Asked if he made a wrong button push, Musser stated the FO froze, did not move the throttles forward and was losing airspeed. The FO seemed to lose his composure and was too disturbed to talk on the radio for about 5 minutes. The FO was very concerned about not following procedure and Musser was not sure if this was due to the QAR or not. The flight was a termination flight in Seoul and they had 10 to 15 minutes in the cockpit during which they could debrief. Musser explained they had clear skies, no virga, no clouds, and temperature and winds had remained constant for the last 10-12 hours. The FO said "yes you told me that, but I have to make a report." Musser could tell there was something bothering him.

Captain Musser was asked if this was an event that would have prompted him to go to the chief pilot because of the FO freezing up. Musser stated he thought the FO learned something from that event and Musser tried to give him the benefit of the doubt. He had flown with him before and this was something that was really surprising. If Musser had reported the event that the FO probably would have been fired.

He was asked if he knew any pilot who had been fired because of a captain report. He stated he had heard that. He said FO's were frustrated because pilots were promoted by who they knew and not by seniority. Many would leave after they gained experience to fly for Qatar or others and became captains whereas they would have remained FOs at Asiana.

He was asked how the FO's performed as pilot monitoring (PM). He stated the ab initio FO's had a better understanding of his briefings but he did not get as much feedback from the military trained pilots if something was out of parameters or SOP. The Asiana airplanes had a tendency to overspeed at cruise because the company didn't pay for a modification that could fix that. Some FO's would constantly pull the power back and say "speed," grabbing the throttles and pulling them back to idle. Musser said don't do that; just bring them back a little. This was when flights were approaching Mach .86 when you're supposed to be cruising at .84.

The go around policy at Asian was consistent with the standard Boeing that put out, and stabilized approach criteria was applied at 500 feet for visual flight and 1,000 feet for instrument flight. Regarding go arounds, he had experienced two during his time at Asiana, neither of which was due to stabilization. He did not recall if a report was needed, but if it was he would have the FO do it.

He was asked if his initial written test when he was hired was an Asiana company test. He stated it was a test from the MOT like an ATP written exam in English, but 70% of the test was about penalties, fines or jail, for things done wrong, and these were the things he had to study. As an example, he stated a runway incursion could result in a penalty.

He was asked if Korean aviation regulations were available to him in English. He stated they had Jeppesen charts with different national regulations. He believed the Korean regulations were available in English but he had never looked at them, and he thought they were a copy of U.S. regulations.

He reiterated that about 50% of the landings were autoland. It was required to disconnect the AP above 200 feet if you planned to land manually, and most pilots who were not going to do an autoland would disconnect the AP around 1,000 feet.

He was asked if he had any additional comments on anything the group did not ask. He stated that sometimes there were extreme English communication skill deficiencies with the FO's he dealt with. Several times there were miscommunications and an inability to communicate with ATC in the US. When he came on the radio they got better handling. On one occasion if he hadn't spoken, they would have had to divert.

The interview concluded at 1000 EDT.



**Interview:** Rick Allen Mayfield, FAA POI for Asiana  
**Represented by:** Andrew Dilk, FAA  
**Date/Time:** September 27, 2013, 1000 EDT  
**Location:** via teleconference  
**Present:** Roger Cox-NTSB; William Bramble-NTSB; Dan McLucas-FAA; Linda Orlady-Boeing; Cho Yong Sun- Asiana Airlines; In Suk Sun – KARAIB; Alice Park-NTSB (interpreter); Tony James - FAA

During the interview, Mr. Mayfield stated the following:

He was 58 years of age and was an International Aviation Safety Inspector in the Los Angeles International Field Office (IFO) of the FAA. His specific duty was to be a principal operations inspector. He had been in his current position since January, 2010, when he was assigned to the San Francisco International Field Office. That office had become part of the LA IFO. His last previous position was as POI in the Oakland Flight Standards District Office (FSDO). He had been employed with the FAA since September, 1981, and had been the FAA POI for Asiana Airlines for at least 2 years.

There were three FAA inspectors assigned to oversight of Asiana: a POI, a PMI (principal maintenance inspector), and a PAI (principal avionics inspector). Mr. Mayfield was POI for 14 foreign (Part 129) air carriers including Asiana. In addition to the three inspectors assigned to Asiana, the FAA had geographic inspectors in various locations. Asked how many geographic inspectors helped with oversight of Asiana, he stated he didn't have that information. At each of the airports that were listed in Asiana's operations specifications (ops specs) as regular airports, 3 FAA inspectors (POI, PMI, and PAI) based at those airports would be responsible for the ramp inspections to be done at that airport. If there were 10 regular airports there would be 3 at each airport or 30 inspectors involved.

Asked how many PTRS entries had been made for Asiana in the last year, Mr. Mayfield stated he did not have that information at hand but there were many entries in a year and the records could be obtained by request. He could not recall how many inspections he had made of Asiana, but that number could also be obtained by request. POI's at IFO's were not normally required to do ramp inspections as part of their job description. Local offices did the inspections, but he had done several himself in SFO as part of his duties to provide on the job training for the Oakland office. He had seen PTRS entries for Asiana and couldn't recall any specifics, but he believed Asiana was in compliance with part 129.

The only type of inspection the FAA was authorized to do on Asiana was ramp inspections. Speaking on behalf of his own inspections, he could not recall any irregularities on Asiana airplanes. The records would be in PTRS. Asked if he ever reviewed those records, he stated Asiana received a regular review each year, usually in the month of November.

Asked about the number of required ("R") inspections required to be done on a foreign carrier, he stated FAA order 1800.56N provided exact guidance and was used to develop a work

document. One ramp inspection was to be done for each scheduled passenger/cargo part 129 operator at each airport per year for each specialty (ops, maintenance, avionics), and non-scheduled flights also needed to be considered. He stated the order 1800.56N also addressed inspections required when a carrier was on a heightened surveillance list (HSL).<sup>9</sup>

Asiana was currently on the standard rotation. The number of inspections was generated from FAA in Washington D.C. and was on the standard frequency. After the Asiana accident he requested that Asiana be put on the HSL, which would require geographic inspectors to conduct one additional ramp inspection for each of the airports where Asiana operated. Asiana had not been added to the HSL as of this date, although AFS-50 had requested additional information which he had provided to them. He thought the FAA was preparing to add Asiana to that list.

Mr. Mayfield was asked if he was notified of violations or enforcement actions against one of his airlines which were initiated by other FAA offices. He stated when there was a possible violation of a foreign carrier, the local office was responsible for conducting an investigation and handling enforcement. His office stood ready to assist the local offices, and he could track those investigations in SPAS. He had not been notified of any enforcements being conducted against Asiana.

Mr. Mayfield was asked if he had any contact with Asiana personnel at their headquarters or with responsible officials in Korea. He stated there were a few people they worked with on a regular basis, and those interactions were documented in PTRS. His primary contact at Asiana was Mr. Kyungwoo Kim of flight operations engineering. The subject most commonly discussed was the maintenance of operations specifications. Mayfield had not visited the company in Korea. When asked how the FAA determined when an on-site inspection should be conducted in Korea, he stated he had previously provided the NTSB detailed documentation of the IASA (international aviation safety assessment) program which explained how that process worked.

Mr. Mayfield was asked what cabin related oversight issues he conducted, including such items as safety briefing cards, and flight attendant procedures, training and qualifications. He stated inspectors would review standard safety-related items described in the FAA order 8990, such as fire extinguishers, megaphones, flashlight, flight attendant seating, seat belts and briefing cards. Asked if there had been any findings in that area in the last year, he stated he did not have that information at hand but it could be provided by a review of PTRS records upon request. With regard to flight attendant procedures, training and qualifications, the FAA did not get involved because that was the responsibility of the air carrier and the controlling member state CAA.

Asked what action he would take if he found a violation or safety concern in the cabin, he stated if it was a gross discrepancy the inspector would bring it to the attention of the air carrier. He did not recall the last time he had identified a cabin safety item. All specialties (POI, PMI, and PAI)

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<sup>9</sup> Mr. Mayfield later clarified that per Order 1800.56N, one each ramp inspection (1622, 3627, 5627) on each scheduled passenger and/or cargo Part 129 operator would be done at each airport of operation per year. He also clarified that operators appearing on the HSL will receive one additional ramp inspection quarterly at each airport of operation (1622, 3627, and 5627) until the FAA removes the operator from the HSL. He stated the HSL inspections are locally generated by the field office responsible for geographic surveillance at their respective airports.)

were trained to conduct the cabin portion of a ramp check. He had received training from the FAA on how to conduct cabin-related items. He could not provide a complete list of items, but they included all the basic items previously discussed. He explained there were three stages of on the job training (OJT), an initial stage and then steps one, two and three. Following computer based instruction (CBI), there was one-on-one training with the OJT trainer, and then the inspector was signed off. Asked if the training was thorough and effective, he stated it met the standard for OJT, and if the inspector met the standard he was signed off as fully qualified for that job function.

Mr. Mayfield explained that the focus of his activities as a part 129 POI was to maintain each carrier's ops specs, to approve various paragraphs of the ops specs which allowed the carrier to conduct operations in the U.S., to review the performance of each carrier and to generate recommendations for the work program. He made suggestions for work program criteria which worked through the geographic program. These duties took 100% of his time. The ops specs contained all the operating authority given to the carrier for operations in the U.S. The number of pages in the ops specs was available and had been provided to the NTSB. He felt his workload was adequate, and the other carriers he had assigned to him were similar in size to Asiana.

Mr. Mayfield was asked to discuss general aspects of ramp inspections. He stated the scope of the inspection was determined by the inspector, but in general they cover flight ops areas, check credentials and paperwork the carrier should have on board. They walk through the cabin, check emergency equipment, inspect the interior and exterior for discrepancies, and inspect the cargo and cargo hold. With regard to any warning flags in SPAS, he stated he would have to check SPAS. He stated SPAS gave a general synopsis of the reports in PTRS, and he could bring up PTRS and check notations and comments. SPAS was a tool they used to bring together PTRS reports from all across the country. Asked about flags for Asiana, he stated they get flags on different items, but there was nothing unusual for Asiana.

Mr. Mayfield explained SPAS stood for safety performance analysis system. Asked how a ramp inspection for a foreign (part 129) carrier would vary from one for a domestic carrier, he said you looked for compliance with different rules. For domestic carriers, part 121 applied. Foreign carriers were not bound by part 121 but by ICAO agreements, so they were looked at a little bit differently. He stated there were differences but he could not give an example.

He stated the FAA was not authorized to ride a foreign carrier jumpseat or to conduct cockpit or cabin enroute inspections. With regard to special airports, those airports were not defined by the carrier and special airport requirements were included in the carrier's ops specs. The specific requirements to operate into those airports were specified in the ops specs, and Asiana had an ops spec for special airports. Asked if the ops spec for airports would address training, he stated the requirement to comply with the ops specs was the carrier's responsibility. He stated we issue it and they comply with it. Asked if he made an assessment of how Asiana would comply with the rules, he stated the FAA did not approve ops manuals or crew training programs, they had no oversight of these items, and it was the foreign CAA that approved them.

Mr. Mayfield was asked if there was a system in place where the FAA would be notified in the event of a problem or violation. He stated if the foreign CAA requested assistance from the FAA,

they would provide it. However, that CAA was responsible for oversight of the carrier, and if there were discrepancies found in whatever inspections they do, they were responsible to see that it was corrected. He stated he had responsibility for most of the Asia Pacific carriers, including Korean Airlines (KAL), but he had no comment regarding any differences in inspections or reports between KAL and Asiana. He could not recall the most recent discrepancy he had found. He stated it was not his job function to go out and inspect carriers. Geographic inspectors did that, and their write-ups, if any, were available upon request.

Asked if he had anything additional he wanted to say or if there was anything else we should be looking into as part of our investigation, he had said he had nothing to add.